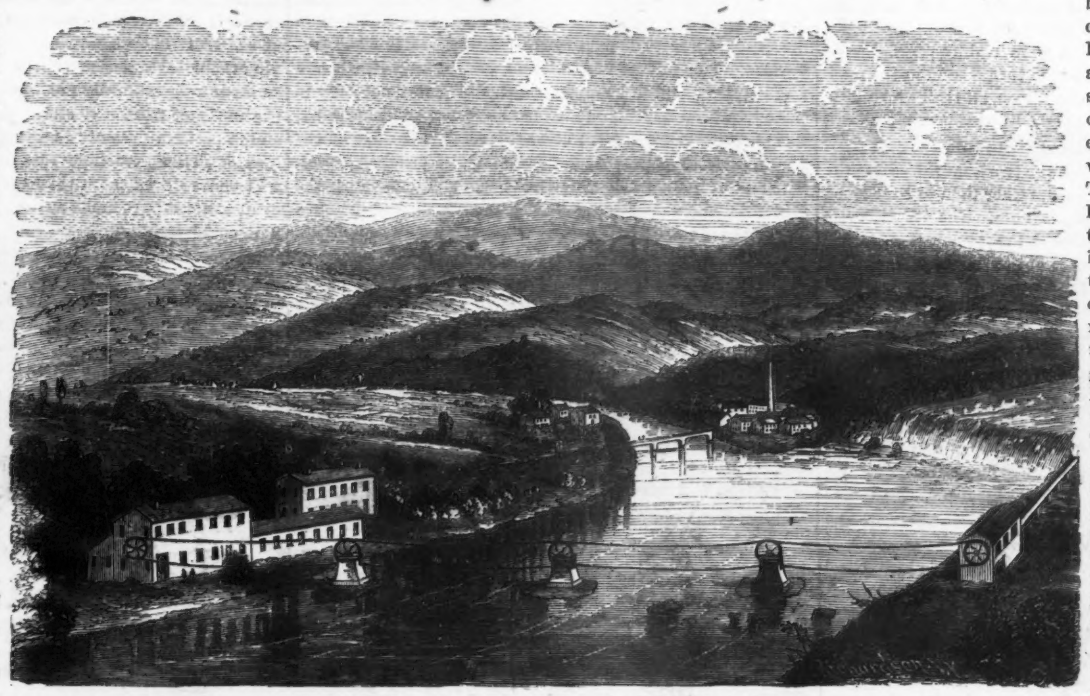
THE ENGINEERING AND MINING JOURNAL.

VOL. VIII.—NO. 2.—THIRD SERIES.] NEW-YORK, TUESDAY, JULY 13, 1869. [SINGLE COPIES, 10 CENTS.

Transmission of Motive Power by Means of Wire Ropes.

THE inconveniences attending the use of shafting, belting, etc., in the transmission of power to remote distances are very great. In these days, when so much attention is bestowed upon home manufacture, manufacturing establishments are being daily enlarged to meet such demands—frequently rendering the necessity of furnishing extra motive power at a great cost, the ordinary means of transmitting the motive power by shafting, belting, etc., being but too often insufficient or inexpedient for economical application, and for the transmission of the surplus main motive power. There are numberless cases where motive power is sacrificed for want of connections, etc., particularly water-power, whose turbine or wheel is often of necessity situated far from the point of application of the desired power. A system of wire-rope connection presents an excellently practical means of transmitting power to an extended or extreme distance. Such an application, although by no means new in its adoption, is not so general as its economy merits. Let us, for the sake of illustration, consider the application of this system to the transmission of water-power. Admirable sites for water-power are abandoned because of the difficulty of connection between the point of the derived power and its motor, to that of its application, by reason of excessive distance or inaccessibility, or impossibility of erecting the machinery, etc., adjacent to the motive power. But by means of wire ropes the force otherwise unapplied can be utilized with economy of power and cost, whether the direction be up-hill, or down-hill, or along a slope of even 1 in 8. The power can also be distributed, as convenience may direct, to numerous stations. By such a method, power may be transferred across a river, as shown in the accompanying engraving—advantage being taken of any natural disposition of rocks, etc., for stations or piers, whereon to erect wheels for the running of the rope, if the river be one of much width. In the neighborhood of Frankfort-on-the-Main, in Germany, the power of a 100 horse-power turbine is conveyed for a distance of 3200 feet! by means of a rope transmission, to a cotton-factory located in the most convenient position for such a building. Wheels 13½ feet in diameter, making 114 revolutions per minute, are used; a ⅝-inch rope only is required—there are eight stations, 400 feet apart. A nearer site for a building could not be found, and this was the only way that power could be made available for the purpose.



WIRE ROPE A TRANSMITTER OF MOTIVE POWER.

In another case—that of a powder-mill—shops were erected four hundred feet apart, along the circumference of a circle having a diameter of about twelve hundred feet. In the centre a water-wheel supplied the power, which was conveyed to each shop by means of a rope transmission, the central building thus commanding the whole. In this particular case of gunpowder-mills, the isolation of the various shops without the necessity of the employment of individual motive powers was a very advantageous arrangement. One of the greatest advantages consists in the substitution of wire-rope connections for heavy counter shafting with bevel gearing. It can also be profitably applied as a substitute for horse power used in out-door work; also for rolling-mills, contractors' operations, and the like.

A remarkable example might be cited of the utility of wire ropes as transmitters of motive power at the falls of the Rhine, near Schaffausen in Switzerland. Advantage was taken of the rapids upon one side, and a number of turbines put in, aggregating to a horse-power of six hundred. Since the steep rocky banks forbade the erection of any factories in the immediate neighborhood, the entire power was transferred diagonally across the stream to the town, about a mile lower down, and there distributed, certain rocks in the water being made serviceable in setting up the required intermediate stations. There are doubtless hundreds of similar localities in our own country which might be improved in this way. New-England, especially, abounds with them: coal being there so expensive, their value may be considered all the greater. At the same time, the rough and rocky nature of most of her river-banks has in many cases proved a barrier to the erection of factories near by, but by the system of rope transmission much of this waste power might be devoted to productive purposes. The wire rope for the purpose varies only between three eighths and three fourths of an inch in diameter in a range of from three to two hundred and fifty horse power. With regard to the flexure of the rope, referring to Fig. 1, it may be observed that the upper rope is the pulling rope and the lower one the loose following rope. When the rope is working, the tension T in the upper rope is just double that in the lower rope; hence the latter will sag much lower below a horizontal line than the upper one. When the rope is at rest, both ropes will occupy the position indicated by the dotted line, and will have a uniform tension. The best way in practice is to hang up a wire in the position the rope is to occupy at rest: that has to be done in any case, in order to get the length of rope needed. Then hang it so that the deflection d', below the horizontal line, is about 1-35th of the whole distance from wheel to wheel. The deflection d of the upper running rope will then be about 1-45th to 1-50th. The deflection d'' of the lower working rope is on an average one half greater than the deflection d' of the rope at rest. This is of importance, as we should know beforehand whether the lower rope is going to scrape on the ground or touch other obstructions; in that case, we either have to dig a trench for the lower rope to run in, or else raise both wheels high enough to clear.

Practically, however, it is not necessary to be so particular about this matter, on account of the stretch in the rope. Wire rope stretches comparatively very little; still there is some stretch, and it is well to allow for it by stretching the rope a little too tight at first; after running a little it will hang all right. When the rope is very long, it is advisable to take up the stretch at the end of two or three months, as a slack rope does not run so steadily as a tight one. Whenever the direction of the motion of the driving-wheel is not fixed by other circumstances, it is often advisable to make the lower rope the pulling rope, and the upper the follower, as shown in Fig. 2. In this way obstructions can be avoided, which by the other plan would have to be removed. The ropes will not interfere as long as the difference between the two deflections d' and d'' is less than the diameter of the wheel. These limits are of use whenever, on account of rocks or otherwise, we have to move the wheels closer together, and the question is how far to have them apart with a certain deflection. There are questions arising as to wear of ropes, and chafing and fraying thereof, but these disadvantages are more apparent than real. It is recommended that hempen rope, soft wood, or rubber be inserted into the grooved peripheries of the wheels.

The cost is very slight when compared with other modes of transmitting force, and the durability of the ropes is calculated at from two and a half to five years. These few cursory remarks may be sufficient to bring the subject before the serious attention of engineers. Hereafter we may treat the subject of rope transmission in a more detailed, practical manner. To Mr. W. A. Roebling, an engineer, who has advocated the importance of this subject and demonstrated its economy with much forcible clearness, we are indebted for many of the facts now presented to our readers.

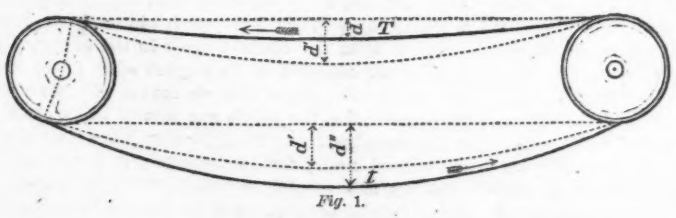


Fig. 1.

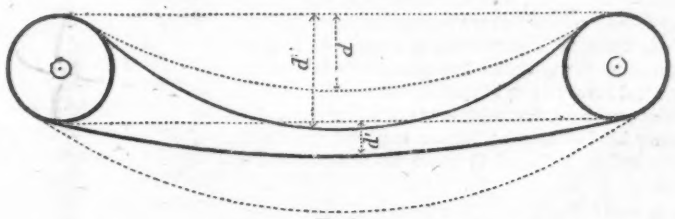


Fig. 2.

THE gold-fields of the Cape of Good Hope, it is said, will prove a failure. The Australian gold-fields have increased in productiveness last year. Gold has been discovered in the protogene rocks in Sutherlandshire, Scotland, on the estates of the Duke of Sutherland. In the sixteenth century it was found in valuable quantities at Durness, on the north coast of Scotland, and supplied, for the most part, the bullion for the Scottish money.

THE Hall of Arts and Sciences now being erected near the site of the 1862 International Exhibition in London will be one of the largest structures of the kind ever built; it will be roofed over with a gigantic elliptical construction of iron and glass, exclusive of an extensive orchestra. Eight thousand persons can be seated. Every regard will be had as to its acoustic properties. Its construction involves the expenditure of $1,200,000!

SALT has been discovered at Holstein, at a depth of 500 feet; its position between the Baltic and Northern seas will offer great advantages in transportation.

The Roads of New-York Central Park.

BY WILLIAM H. GRANT, SUPERINTENDING ENGINEER.

THE ancient Romans were the most notable road-makers of whom we have any account. They made their roads on a liberal scale, both as to mode and extent, with unstinted labor and cost, and considering the main object they had in view, which seems to have been indestructibility rather than convenience, they were made with great skill. Their plan was copied from the most indestructible form of nature—the solid rock—and with their imperial ideas and imperial power, it was carried out by following the closest imitation practicable. Rocks were detached from the quarry in masses that could be transported, hewn into proper shape, and replaced together closely joined, to form the superstructure of the road, a foundation having been previously prepared, with great pains, to receive and support the material. The rigid and unyielding surface was made sufficiently smooth for use, and the Roman ideal was attained of a work that was imperishable. Samples that are still extant show how thorough was the workmanship, and how well the builders understood their art; the broad blocks of stone show evidence of long service in the groove-marks of carriage-wheels that passed over them two thousand years ago, but in other respects no change has apparently taken place since the work was constructed. One peculiarity of the Roman roads, besides their solidity, was their general straightness, no ordinary obstacle being permitted to turn them from their direction and cause sinuosities. Ascents, descents, and declivities, far more objectionable, were secondary to this principle. "This has been attributed to an imperfect knowledge of mechanics, for the Romans do not appear to have been acquainted with the movable joint in wheel-carriages. The carriage-body rested solidly upon the axles, which, in four-wheeled vehicles, were rigidly parallel with each other. Being unable readily to turn a bend in the road, it has been concluded that, for this reason, all their great highways were constructed in as straight lines as possible." *

No improvement appears to have been made upon the Roman plan until within the last one or two hundred years; the art seems to have retrograded even, rather than to have stood still, for a long time after the Roman era. The progress was extremely slow when it commenced, the principal advances being found almost within the present century. It has been said by a modern writer, that the roads of a country or a community are a correct index of the degree of civilization prevailing with the people, and this idea is well illustrated in recurring to the long interval in the past, during which no progress was made in the art of road-making. In England, as late as the reign of Queen Elizabeth, the state of the roads was such that travelling was done throughout the kingdom principally on horseback, by horse-litters, and on foot. Coaches are said to have been first introduced into England during that reign. The mode of making roads, up to that time, was but a poor imitation of the old Roman mode. The remains of the old Roman colonial works still existed in many places, and were probably the best portions of the roads in use. It had become so difficult to maintain the more modern roads that they were, from time to time, abandoned for new tracks that were opened through fields and across lots (as is the case sometimes in this country, with roads that are temporarily obstructed by snow in winter). Roads that had long been in use were, in some places, so worn down into the soil, by neglect and the action of rains, as to form trenches or chasms thirty to forty feet deep, which gave rise to local names, as Holloway, and the like. The streets of London were no better than the roads of the country, a filthy stream being permitted to flow through a roughly paved gutter in the middle of the street—improved carriage-ways and flagged sidewalks, as now in use, being then unknown. The transportation of the country was done by pack-horses, with panniers, going in droves, in double or single file, clambering over all sorts of ground that would be considered, at this day, impassable. Notwithstanding these difficulties, the introduction of an improved class of roads and stage-coaches met with much popular opposition. Long after the introduction of stage-coaches the roads continued to be so bad as to nearly prohibit their use. A writer of the time, who had made a journey to London by coach, says: "This traval hath soe indisposed me yt I am resolved never to ride up againe in ye coatch." Coach travelling was not only a great hardship, but was extremely dangerous, from the numbers of serious accidents and misadventures that are reported to have occurred. When these things are remembered, it is not to be wondered at that Dr. Johnson was wont to extol the pleasures of a drive, with a spirited horse and an agreeable companion, over a fine road, as among the greatest enjoyments of life, when such an exhilarating kind of exercise became safe and practicable. The Doctor had been obliged to make his wedding-tour on horseback.

It may be noted, that among the objections that were urged by the opponents of stage-coaches and superior roads, was that which arose from a fear of apoplexy, caused by the "incredible speed" of six or eight miles an hour; a number of cases were referred to as having been produced by this "too great rapidity of motion." The journey from Glasgow to London was made, in 1774, by a "flying coach," in the space of two weeks. Arthur Young says, at a later date, of a road that he had travelled: "I know not, in the whole range of language, terms sufficiently expressive to describe this infernal road. Let me most seriously caution all travellers who may accidentally propose to travel this terrible country, to avoid it as they would the devil; for a thousand to one they break their necks or their limbs by overthrows or breakings-down. They will here meet with ruts, which I actually measured, four feet deep, and floating with mud, only from a wet summer. What, therefore, must it be after a winter? The only mending it receives is tumbling in some loose stones, which serve no other purpose than jolting a carriage in the most intolerable manner." Sidney Smith, at a considerably later date, says, characteristically, that "Before the age of stone-breaking, MacAdam, and of railways, it took him nine hours in travelling the forty miles between Taunton and Bath, during which he suffered between ten and twelve thousand severe contusions, whilst his clothes were rubbed to pieces by being jolted about in the stage-coach basket, which was without springs." "Whatever miseries I suffered," he adds, "there was no post to whisk my complaints, for a single penny, to the remotest corners of the empire; and yet in spite of all these privations, I lived on quietly, and am now ashamed that I was not more discontented, and utterly surprised that all these changes and inventions did not occur two centuries ago."

* Smiles—*Lives of the Engineers*.

These examples of the condition of the English roads are taken from the work before referred to, by an English writer. They will suffice to show the great need of a higher civilization—if roads are taken as the test — than existed in one of the most advanced states of Europe up to the beginning of the present century. The same writer gives numerous instances of the state of society at that period, that very much strengthen the idea of an intimate relationship between superior roads and superior intelligence and refinement. The prejudices against the innovations of stage-coaches and other vehicles, and roads adapted to their use, gradually wore away, and with the growing desire and necessity for improvement, the work at length was taken hold of in earnest, and put in the hands of a class of men who were equal to the task demanded. The fulness of time had in fact arrived, when a new era was about to be inaugurated, which was not only to make advances upon the old Roman ideas of road-making, but was to renovate, in a more enlarged sense, the ways of the world; perfecting old arts and developing new ones; enlarging the scope of human thought and action, and expanding the field of human enterprise to an extent never before dreamed of. The next seventy-five years were to represent, in progress, many preceding centuries. It was thought singular, as far back as 1768, that the engineer, Smeaton, should give his attention to the subject of road-making, as, from the low state of the art, it was considered a condescension, and derogatory to an engineer, to devote his time to the business. But this prejudice was soon to pass away. The successors of Smeaton —Brindley, Rennie, Telford, and others, most distinguished in the profession—entered upon the duties, in the employ of the government and of incorporated bodies, and brought their highest skill and qualifications into the service. Between 1784 and 1792, three hundred acts of Parliament were passed, authorizing the construction of roads and bridges, and within the space of a few years these engineers surveyed and executed a well-planned system of roads and bridges over several parts of the kingdom. John Rennie, a Scotch engineer, was among the most prominent in the construction of bridges. Among his works of this kind are the Waterloo, Southwark, and New London bridges over the Thames, besides many others, in England and Scotland. The New London bridge was designed by him, but completed by his son, Sir John Rennie. For his success in the design and construction of Waterloo bridge in particular, the elder Rennie was offered the honor of knighthood, but declined it. He was the first to adopt the method of breaking up stones into small pieces, to form the surface of roads, which came into extensive use afterward, under the general name of MacAdam roads. He seems to have claimed no special merit for the invention, and the public were misled into awarding the credit to MacAdam, who did not make such roads until several years later. It may be remarked here, also, that Rennie was the inventor of hollow walls, as made use of in large structures of masonry to admit of greater breadth of foundation with less weight, which was subsequently appropriated by another person (not an engineer), and the invention patented by him.

In 1803, Telford—also a Scotch engineer—undertook, in the employ of the English government, the survey and construction of nine hundred and twenty miles of roads in Scotland, and in connection with this work, he built, it is said, no less than twelve hundred bridges, many of them large and costly, and they are still among the finest specimens of bridge architecture extant. He was employed at this about twenty years. So extensive and successful were Telford's works of this kind, that he was humorously designated by his friend—the poet Southey—as "Pontifex Maximus." He continued, later, the construction of roads (upon a superior plan specially designed by himself, which will be described hereafter, and which has since appropriately gone by his name) in England and Wales, until the general progress and spirit of enterprise which had been engendered in the direction of common roads was abated by the construction of canals, and the incipient advances of railways. His greatest work, as an engineering achievement, is probably the suspension-bridge over the Straits of Menai, although his roads, harbors, and canals were of greater general utility. England is indebted to no man more than to Thomas Telford for her material prosperity growing out of the multiplicity of public improvements that he executed. The list of the works that he planned and carried out, through a long and active life, would fill many pages. The engineering profession has had no more able exponent. His example and works afford a highly profitable study to the young engineer. He was self-made, rising from humble origin, and encountering many obstacles in early life. It is proper to add, that he was honored and appreciated by his government and people, and finally found a resting-place in Westminster Abbey. Telford remarks upon the astonishing effects of the early improvement of the roads of the country upon the customs, manners, and industry of the people. "By these improvements," he says, "the moral habits of the great masses of the working classes are changed." "I consider these improvements among the greatest blessings ever conferred on any country." "It has been the means of advancing the country at least a century."

Since his time it has not been held as derogatory to engineers to give their attention to road-making, nor has it been found that the art was unworthy of some of the best efforts and appliances of engineering skill. A great deal of time has accordingly been devoted of late years to the investigation of the subject, and numerous modes and expedients, together with a great variety of materials, have been resorted to for the purpose of improving or economizing the construction of roads, and much ingenuity and ability have been expended and treatises written upon them. It will not be practicable to cite here these examples. Such hints and ideas as have been culled from them, and found available and advantageous, have been embodied in the roads of the Park There is no doubt that great improvements are still to be made in road-making—in the discovery, perhaps, of new materials, and in different modes of treatment—to produce more agreeable adaptations of the surface of roads, and possibly greater economy and facilities of construction; but in the various plans that have hitherto been brought into public notice, there is nothing to indicate that such improvements are likely to occur immediately, or at least to be of such a nature as to supersede the prevailing practices. The safest course is believed to be to adhere to plain general principles of construction that have been well demonstrated, and to employ the usual materials (of the best available quality), such as seem to be naturally provided for the purpose; to perfect the mode of treatment and details, in all practicable ways, and to perform the work in a thorough manner. The Roman idea of an indestructible road is impracticable; a road that will endure even more than a very few years, it is inexpedient to attempt to make at the present day; for such a road, if it could meet the conditions of economy, would not be likely to meet the conditions—which are quite as absolute—of ease, convenience, and safety. The best that can be done, in the way of endurance, is to prepare a foundation that will remain intact when the superficial material wears away, and that will permit the renewal of that material without disturbance or decay. The efforts that have been made to construct city pavements that would resist the destructive forces and ceaseless abrasion they are subjected to, and obviate the necessity for almost constant repairs, have generally failed. The Russ pavement, cast-iron pavement, and other forms that have been tried in the city of New-York, are instances of this kind. The Russ pavement, composed of large blocks of stone, is an imperfect repetition of the old Roman road. The present method of paving, with small cubes of stone (called the trap-block pavement), if done on a suitably prepared foundation, seems to be about as well adapted to all the conditions of the problem—as regards city streets and great thoroughfares—as can reasonably be expected for some time to come. It is not easy to see how this method could be improved (though it doubtless will be) if carried out thoroughly and faithfully. The materials are abundant, accessible, and—as to the stone, from the Palisades—of the best quality, and inexhaustible. The foundation can be, and should be, prepared in the best manner, so as to give a firm and equable support to the stones, and obviate caving in and disruptions, and of a sufficiently permanent character to admit of the renewal of the stones above without breaking it up. The size of the paving-stones is about a practical medium, sufficiently large to prevent crushing, and small enough to be spanned by a horse's foot, in such a way that one or more of the points of the shoe, when put down, will strike into, or very near, a surrounding crevice to prevent slipping. The bottoms of the stones have breadth enough, when properly squared, to give them a good bearing on the foundation material, and the upper surface is as even and regular as is compatible with the mode of construction—not as smooth (or as dangerous) as the Russ pavement, nor as rough as the cobble-stone pavement. It is not adapted to pleasant or comfortable driving, and therefore not suitable for a park or private grounds. For these purposes, a less expensive form of road is preferable. In closing this part of the subject, it will not be amiss to add a remark upon our common roads in the country. In reviewing the condition of the English roads, in the last century and the fore-part of this, we cannot felicitate ourselves with the idea that the picture was painted in the olden time, and has no relevancy to us; it fits closely to a state of things that existed nearly contemporaneously in this country, and which has, unfortunately, not wholly disappeared even at the present enlightened day. Without referring to examples of stage-coach travelling that would set many people's bones to aching, and recall experiences of suffering and privation, we may say that it is not necessary to go far, or to search very carefully, for cases of bad roads; we may not find them with "ruts" quite "four feet deep," but we will find that it is still a prevalent practice in making, as well as in repairing, roads, to "tumble in loose stones," and to cover them over, more or less, with most unsuitable materials. In repairing (so-called) country roads, in particular, it is a common and most reprehensible practice, after tumbling into the ruts loose stones, to run a plough through the side ditches, and scrape together into the middle of the road the long-collected compound of road detritus, mud, weeds, and other unwholesome matter, resulting in the forming of a compost-bed that

lasts but a brief time, and then disappears in clouds of dust, or in mud, leaving the projecting stones to "jolt a carriage in the most intolerable manner." With abundant materials that the country furnishes, in most cases, for making respectable, if not superior, roads, at but little if any greater cost (at less cost, in the long run), these slip-shod practices continue. How often do we see those "hollow ways" in country roads, consisting of deep and dangerous gullies, worn down by rains that are permitted to concentrate from adjoining grounds, until the well-worn bed presents the appearance of having been designed for an artificial water-channel to drain the surrounding country, rather than for a highway for public convenience.

[To be continued.]

The East River Bridge.

MR. ROEBLING has exhibited, in his connection with the above undertaking, that soundness of judgment and appreciation of discretion which has so largely contributed to the success of the many gigantic enterprises he has carried out. The Board of Directors of the "New-York Bridge Company" selected Mr. Roebling to carry out the project of connecting New-York with Brooklyn by a suspension-bridge. The Board accepted his designs, and gave full power to have them put into force. But Mr. Roebling, exercising the discretion above referred to, and contemplating the magnitude of the work he had undertaken, suggested that the designs for the proposed bridge be submitted to a board of eminent engineers and be reported thereon, independently of the Board of Directors. The Directors seeing the wisdom of Mr. Roebling's proposal, at once acquiesced. The services of Messrs. Horatio Allen, Benj. Latrobe, Wm. J. McAlpine, James P. Kirkwood, Julius W. Adams, J. Dutton Steele, and J. J. Serrell, were engaged to examine his designs. Such eminent names form a diploma of the excellence and unprejudiced character of their analysis, of which we append:

To the Directors of the New-York Bridge Company:

GENTLEMEN: Having received, through Mr. Roebling, Engineer of the New-York Bridge Company, the request of the Directors that we should, as a Board of Engineers, make careful examination of the plans proposed by him, for the erection, over the East River, of a wire cable suspension-bridge of 1600 feet span, and 135 feet elevation above low water, and make report as to the practicability, adequacy, safety, and durability of the structure as proposed, and having accepted the trust reposed in us, and having given the subject the full consideration and careful investigation which its great magnitude and the large interests involved demanded, we have now to submit a report of our proceedings and of the conclusion at which we have arrived. On coming together as a Board, our first action was to obtain a clear knowledge of the object for which the Board had been convened. It was then ascertained that the object was not one of service to the Directors in their consideration of the plans proposed, or their action on the adoption of the plans; for that consideration had been given, and that action had been taken, and was before the public; and also that it was not the object that the engineer of the Company should have the aid of the counsel and suggestions of this Board, in maturing its plans, and deciding the many important questions involved in the proposed structure—for the plans had been matured, and the decisions had been presented in a report, stating fully and clearly the general character of the structure, with such reference as to details of combination and proportions as was appropriate. Through the inquiries which led to this information, the Board learned, that, after the adoption of the plans recommended by Mr. Roebling, and after the decision of the Directors to go forward with the undertaking, Mr. Roebling requested of the Directors that a Board of Engineers should be convened, before whom the plans in all their details should be laid, in order that their professional judgment should be obtained as to the practicability of the erection of a suspension-bridge 1600 feet span and 135 feet elevation above the water on the plans proposed by him; as to the adequacy of the structure, when erected to sustain the greatest load it would have to carry, alike under the extremes of summer and winter, and when subjected to the action of the greatest storms known to take place. This Board was informed by Mr. Roebling, that, in view of the magnitude of the undertaking, and the large interests connected therewith, in the cities of New-York and Brooklyn, he had suggested to the Directors that it was right and proper, before going forward with the work, that his plans should be subjected to the careful scrutiny of a Board of Engineers convened for the purpose, in order that, if his plans received their approval, the enterprise would stand before the public sustained by their professional judgment, and would not rest solely on the judgment of one single engineer. The Board have undertaken the responsible duty thus defined; a duty requiring the greater care, because their action is at the request of the engineer whose plans they were to scrutinize. The plans, including foundations, towers, and superstructure, have, at numerous meetings, (between February 16th and April 20th), held for the purpose, been laid before this Board by Mr. Roebling, from whom they have received at the same time the fullest explanations on every point. In the consideration of what has thus been brought before them, the Board have been impressed by the manner in which Mr. Roebling has sought to have an independent investigation of his plans and proportions, of the severest character.

Having completed the examination of the plans, and the investigations of the combinations and proportions proposed for the service required, the Board deemed it an appropriate part of their duty to examine the structures of the same general character, erected by Mr. Roebling, across the Monongahela and Alleghany, at Pittsburg, in 1846 and 1860, and across the Niagara, at Niagara Falls, in 1854, and across the Ohio, at Cincinnati, in 1867. They have thus had under their eye and personal examination the successive steps, which, beginning with a span of 200 in 1846, was followed by a span of 822 feet in 1854, and by a span of 1057 feet in 1867, all standing this day a practical demonstration of the soundness of the principles and proportions on which these structures have been erected, and rendering unnecessary, at least for spans of 1000 feet, any other demonstration, and affording the best source of information as to the practicability of taking another step in a span of 1600 feet.

The report, which, after these investigations, we now concur in making, is presented in the following statements, having reference therein to a Steel Wire Cable Suspension-Bridge of 1600 feet between the towers, 135 feet above the water, on the plan, materials and proportion of parts set forth in the printed report of Mr. Roebling, made to the New-York Bridge Company: *First.* That the structure, when erected according to the plans and specifications proposed by Mr. Roebling, will possess a strength of parts not less than six times the strain to which they will be subjected, when under the greatest load which will be on the Bridge, and that a strength of six times the greatest strain is a greater degree of provision for safety than is usually made in structures having the same object in view. *Second.* That in the combinations and relations of parts, as proposed for the 1600 feet span, there are none of a novel character, being a repetition of what has been done in the Niagara Bridge, and, on enlarged proportions, in the Cincinnati Bridge; the difference for the span of 1600 feet being a provision of a total strength to provide the same degree of excess of strength in the greater span. *Third.* That the combinations of parts provide in the same manner for the changes of temperature which attend the extremes of summer and winter, which has proved perfectly adequate in the Cincinnati Bridge. *Fourth.* That the structure is amply prepared to sustain the action of the greatest storms of which we have any knowledge. *Fifth.* That adequate foundations for the towers can be had in the manner proposed by the engineer, the particular plan to be used depending on the character of the material developed in the progress of the work. *Sixth.* That, as to the durability of iron put together and placed out of the reach of all elements of decay, in the manner proposed and practiced by the engineer, no limit can be assigned; the facts being well established that iron not acted on by oxygen is as durable as any material of which we have knowledge, and that air and water, the means of furnishing oxygen, can be readily and with ordinary care permanently excluded. *Seventh.* That the pressure on the foundations of the towers will not be increased by the superstructure and the greatest load carried by the bridge more than six to seven per cent; and that, therefore, the permanent stability of the towers depends on the principles well known and used in heavy structures of masonry. *Eighth.* That there are no peculiar difficulties in erecting the proposed structure; that the same means and arrangements by which the Suspension Bridge of 1057 feet span was erected over the Ohio, at Cincinnati, are the means and arrangements to be made use of in the erection of a span of 1600 feet over the East River. *Ninth.* That, in the use of six trusses of large dimensions in combination with the wire cables and stays, there is provided all the rigidity vertically, lengthwise the bridge, that is required, and that in the roadway of 80 feet width, with its horizontal trusses, there is secured a stability horizontally far exceeding that provided in any previous structure of the kind. To the preceding may be added, that, in the inertia of the mass comprised in the superstructure of a suspension-bridge 1600 feet long and 80 feet wide, there exists a stability not to be sensibly disturbed by any action which we can anticipate.

Such being the conclusions we have to present, it will be seen that they sustain the following summary expression: That it is beyond doubt entirely practicable to erect a Steel Wire Suspension Bridge of 1600 feet span, 135 feet elevation, across the East River, in accordance with the plans proposed by Mr. Roebling, and that such structure will have all the strength, stability, safety, and durability that should attend the permanent connection by a bridge of the cities of New-York and Brooklyn.

With this expression of our professional judgment, we could, and perhaps should, close this report. But in the consideration of the circumstances that, in some degree, rendered advisable the action of the Directors in calling together this Board, we have been led to see that it would be in accordance with that object, and also be of some practical value in reference to the use of similar structures in other places in our country, which has yet so much to do in spanning its wide streams and valleys, to present, in a manner not requiring professional attainment to apprehend, the grounds on which confidence in the practicability, safety, and durability of structures of the character proposed by Mr. Roebling can be attained to a degree that will be of practical value to those interested in structures requiring wide spans. The safety of any structure to sustain strain depends on the relation of strength provided, to the strain to be sustained; thus, a sound steel wire, about one sixth of an inch in diameter, will sustain, hanging on it vertically, 4000 pounds—if that weight be increased to 4100 pounds, the wire will probably be broken. This capacity of a sound steel wire one sixth of an inch in diameter to sustain 4000 pounds hanging vertically, is a practical fact, only known by actual numerous trials; it is in no degree a calculation. When six wires of one sixth of an inch diameter are put together to sustain 4000 pounds, known to be within the capacity of a single wire, it is said that a provision of six times the strength is made, and this is what is to be understood when strength "by calculation" is referred to. But when six wires are to be relied on to furnish six times the strength, it must be known that they are so combined that in use the strain of the weight is sustained by the six instead of the one. This is matter of detail not easily presented on paper; the manner of combination must be seen. On examination of the manner in which the wires used by Mr. Roebling are made, tested, and combined, it will be found that they are all straight wires, put together in parallel position, and bound together by temporary wire bands, making what is called "a strand." Strands so formed are put together in parallel position to each other, and form what is called a wire cable.

In the use of wires to sustain weight between towers wide apart, the weight is not sustained by wires hanging vertically, but is sustained by wires suspended between and passing over the towers, and held in position by the anchorage on the land-side.

In such case, calculation and trial are made use of to ascertain what strain a wire thus supported will be subjected to, when a known weight distributed along the wire is sustained with a known deflection of the wire. What that strain is, under known circumstances, is as fully and plainly a matter of fact as the strain is known when the wire hangs vertically.

It is thus known as plain matter of fact that a wire hanging between two towers 1600 feet a part, with a deflection at the centre of 128 feet, will sustain 2300 pounds beyond its own weight, and that if six wires so placed are combined to sustain the 2300 pounds, there will be a provision of six times the strain created by the suspended weight.

It is also well known that the less the depression of the wire hanging between two points, the greater the strain on the wire; and that by taking the proper depression, its own weight may be used to test the strength and soundness of the wire, and determine its actual strength. Mr. Roebling makes use of this means in the making up of the strands of his cables. When the towers are ready to receive the cables, the wires are one at a time stretched over the towers, and drawn by adequate power on the land side to a depression in the centre of 57 feet—the wire will be subjected to a strain of 500 pounds. When wires have been so placed and so proved, they are closely bound together by wire wrappings, and thus is formed what is called a "strand," each wire of which is known to have sustained a strain of over 500 pounds. The strands so formed and so proved are then lowered to a depression of 128 feet. When the required number of strands are brought together, they are tightly bound together by wire wrappings, using powerful clamps to bring the strands closely in contact and to the proper form. This being done from one end to the other, the wire cable is complete. In each of the four wire cables proposed for the East River Bridge, 19 of these strands are used, which will swell their size to nearly 15 inches diameter. It is proposed to use four steel wire cables of this character in the East River Bridge, every wire of which will have been proved after it has been stretched between the towers. It is to be understood that in this combination of wires in a cable they are brought by powerful pressure into the closest contact; it will then be perceived that it would be impossible to draw out a single wire by itself; that if adequate power was brought to act on drawing out a single wire it would be broken, but could not be drawn out.

Experience has shown that wire cables, although of large dimensions and great strength, are to some degree flexible, and that some means that will give greater stiffness lengthwise the bridge is necessary. Such means are introduced by Mr. Roebling, in the Niagara Bridge, and thereby the structure was made adequate to the passage of railroad-trains. They were again used in the Cincinnati Bridge. As proposed to be used in the East River Bridge, they may be thus described: They consist, in connection with the four wire cables, of six trusses of iron 12 feet deep, which are to carry the roadway and extend from tower to tower; in construction they are of the kind now used so extensively to form railroad-bridges, of up to 300 to 400 feet span; in dimensions of parts they are such that any 400 feet in length, supported at the ends and properly proportioned, would more than sustain their own weight without aid from the cables; while the fact is, that the truss is supported by the cable every 7½ feet.

In addition to the use of wire cables in combination with the trusses as described, the engineer proposes to support about 570 feet of each end of the bridge next the towers by wire ropes, of 2½ inches diameter, which being connected with the towers near the top, and with the road-bed at distances from the tower of 50 feet up to 570 feet of the roadway, in a manner well known and extensively used.

The great stiffening power and strength of each of these wire ropes, called, from their position and supporting action on the roadway, *stays*, is practically known, and also their sustaining power, brought to bear on the first five hundred feet from the tower. The use of these combinations at Niagara and Cincinnati has demonstrated that the required stiffness is thereby attained. From this familiar description of the East River Bridge as proposed by Mr. Roebling, it will be seen that the structure will be a combination of four steel wire cables, of near 15 inches diameter, with six iron trusses extending from tower to tower, and 128 stays attached to each tower; a combination which in principle has been adequately proved at Niagara and Cincinnati, and which provides as a matter of fact a strength equal to six times the strain that will result from the greatest load that will ever be on the structure. As to the adequacy of the towers to perform their part, it is to be understood that the pressure on the towers due to the weight of the wire cables, trusses, roadway, etc.,

act vertically through the tower, because the wire cables, lying on the top of the towers, extend on both sides at about the same angle of inclination, and are on the land-side held by a mass of masonry, whose total weight exceeds largely the tension of the cables. To this may be added, that a force equal to about 4000 tons, acting horizontally on the top of the tower in the direction of the bridge, would be required to upset the tower when held in position only by its own weight, and considered as a solid mass.

As to durability. The durability of any material or structure depends on excluding all causes tending to change the condition of the material or of the combination of the structure.

The known durability of wood, when used in foundations at great depths and always saturated with water, finds its explanation in the fact that there are no changes in the condition. There are no alternations of wet and dry, and no material changes of temperature, and a long experience has proved that under such circumstances the condition of the material remains the same.

In the use of iron and steel, care must be taken. Change in the condition of iron or steel can only take place from rusting; that is, from combination with oxygen. Oxygen can only have access to the iron or steel from water or air. If water and air are excluded entirely from contact with the iron or steel, there can be no oxidation, and therefore no change in the condition—consequently, no change in strength.

That it may be understood in what way and by what means water and air are to be permanently excluded, it is to be stated, that when the strands, containing about 270 parallel straight wires, are made up, all the interstices between the wires are thoroughly filled with pure boiled linseed-oil, and that when the cable is made up from 19 of these strands, oil is introduced so thoroughly, that when the cable is wound, there is not an interstice between the wires that is not filled with oil. The winding of the cable thus formed and saturated with oil, is by means of a wire one tenth of an inch diameter, which is wound so close together on the exterior of the cable as to form a surface nearly impervious to water; that surface of wire is then painted with several coats. It will be readily understood that, as long as the external painting is properly renewed from time to time, neither water nor air can ever have access to the wires, and as long as this state of things exists, the unchanged condition of the wire must continue, and consequently the strength of the material will remain unimpaired.

Wood Preservation.

TO THE EDITOR—SIR: While I unhesitatingly sustain the conclusions drawn by a correspondent in a late issue of one of the industrial papers of the city, in his article, "On Coal-Tar and its Products as Preservatives for Wood," I cannot forbear calling attention to some of the statements made by him with respect to the preservative action of salt and carbolic acid, which appear not to be quite in harmony with well-known facts. Moreover, there are some statements in regard to Moll's process for protecting wood from decay which need to be corrected.

As to whether common salt accelerates the decay of wood, your correspondent boldly asserts that such is the case, though it must at once seem strange that a substance which is capable of preserving bodies which undergo decomposition more readily than wood should effect just the opposite when brought in contact with a comparatively stable product of organic nature such as the woody fibre. I may remark that though commercial salt is commonly subject to deliquescence, and, for this reason, is liable to produce dampness, it is always considered an important object for a ship to get a cargo of salt on account of its not allowing the growth of fungi. It should be mentioned, however, that such ships, on account of the dampness, are liable to be unhealthy. I have been informed that, in ship-building in this country, it is not uncommon to fill up the spaces between the timbers with salt; and vessels so built, it is understood, bring a higher price in the market, on account of their greater durability. Again, it is stated that the bottoms of the hulls of vessels engaged in Newfoundland fishery, in which the salted fish are stowed in bulk, will last as long as two or three successive tops. A frigate, it is said, which was infested with fungous rot was accidentally sunk in the Mediterranean, and when weighed again, after remaining under water for several months, was found to be free from fungi, and so continued. These instances may be sufficient to prove that salt does not assist the decay of wood, though it would be easy to relate a number of other cases.

In speaking of Moll's process for preserving timber, which consists substantially in impregnating the timber with the vapors of coal-tar, the correspondent asserts that the patentee found that the so-called creosote of coal-tar was worthless to protect wood from decay. After a careful perusal of Moll's patent specification, which, so far as I know, is the only existing document on this process, I have been quite unable to discover such a statement. Moll only states that the previous purification of the "eupion" from "creosote" will be found advantageous, because the volatility of the eupion and its fluidity will allow it to penetrate into the timber more rapidly and more perfectly than when it is in combination with the creosote. And further on he says that "the antiseptic power of the creosote will be augmented by washing and freeing it from other matters mixed with it." The writer of that article is, however, quite right in stating that the process of Moll is nothing more or less than the one patented in this country thirty years later by Mr. Robbins. And this is the more surprising, as the French Patent-Office granted to Bethell the right of using the vapors of various substances for impregnating timber by means of pressure, one year previous to the application of Mr. Robbins. (*Vide Deutsche Industriezeitung*, 1865, page 395.) These substances are petroleum, naphthaline, schist, and peat-oil, and the tar of coal, peat, and petroleum.

In reference to the failure of coal-tar oil for the preservation of wood, we may say, without entering here into the causes of its decay, that it may be asserted safely that no method has any claim to a scientific endorsement by which the pores are not entirely filled with a perfectly unchangeable material, not liable to be washed out, and not subject to evaporation or sublimation. Salt, provided the timber impregnated with it be not exposed to the prolonged action of fresh water, will protect wood for an indefinite number of years; so will coal-tar and its products, as clearly proved by the correspondent. It is well known that in tight structures of masonry and elsewhere, where the wood is protected from moisture and the ready access of air, it will, even when not impregnated at all, remain unaltered for any length of time. These cases, however, are exceptional, and of no account in any discussion as to the definite value of this or that preservative. The fact that the greenish, fluorescent oil distilled from coal-tar at a high temperature preserves timber better, for a time, than the portions rich in carbolic acid, as reported by Rottier (*vide Breslauer Gewerbeblatt*, 1864, p. 152), sustains our view—that preservatives which are little soluble in water are more effective than the readily soluble ones, as this is the case with carbolic acid. It may be remarked, however, that the greenish, fluorescent portion, on account of its being rich in naphthaline and paranaphthaline, is not only highly inflammable, but also subject to sublimation. But does not carbolic acid, though an effective disinfectant, allow fermentation or putrefaction to take place? That correspondent holds this to be true, sustaining his views by stating that Ilisch, of St. Petersburg, found that some substances impregnated with a solution of this acid showed the formation of mould within a fortnight. I can scarcely believe that the writer of that article, who evidently possesses more than an ordinary acquaintance with technical literature, should be ignorant of the great number of well-recorded experiments which prove that carbolic acid is one of the very best preservers of organic structures, provided they be not exposed to the prolonged action of water and moisture; else I would refer him to the ponderous report of Crookes to the British Government on the cattle plague. One three-thousandth part of carbolic acid, as I am informed by a practical man, will preserve one part of an albuminous dye-solution, such as is used in calico-printing. For the rest, I most heartily agree with him, that "*Experience and science seem to teach that the use of coal-tar or its products is, in most cases, more detrimental than advantageous for the purpose of preserving wood.*" ADOLPH OTT.

NEW-YORK CITY, June 15th, 1869.

Desilverization of Lead by Means of Zinc.

BY H. B. CORNWALL, ENGINEER.

THE first step of the process consists in the *desilverization of the rich lead.*

This is accomplished by melting the lead in a Pattinson kettle, adding the proper amount of zinc, stirring the metals well together, allowing them to cool so that the zinc may rise to the surface, carrying the silver with it, and then removing the crust of zinc and silver. To insure success, the following conditions must be observed: 1st. The lead must be melted at an elevated temperature, and the zinc added in separate portions. 2. The metal must be very intimately mixed and the lead allowed to cool quite slowly, so that the alloy of zinc and silver may separate thoroughly and rise to the surface. 3d. The zinc crust must be very carefully removed, so that none of the rich alloy may fall back into the bath. The amount of zinc to be added is of great importance, and the following table has been found by experience at the Rhenish Works to give the suitable proportions for various amounts of silver:

Lead,	0.025 %	silver requires	1½ % zinc.
"	0.050 %	" "	1½ % "
"	0.100 %	" "	1½ % "
"	0.150 %	" "	1½ % "
"	0.300 %	" "	2 % "
"	0.400 %	" "	2 % "

According to Herr Illing, of Andreasberg, an attempt to treat lead containing 0.125 % silver with only 1½ % of zinc left in the lead twice as much silver as when 1½ % zinc was used. With the latter amount, only 0.0005 % of silver remained. C. F. Flack has given a table in which lead with 0.1 % of silver is to be treated with 1 1-2 % zinc, while for 0.9 % silver only 2 % of zinc is recommended, but it is probable that the foregoing table gives the most reliable proportions. The following description of the operation shows how it is carried on in the Rhenish Works. It is taken from a very complete article on the subject, published in the *Zeitschr. für das Berg-Hütten u. Salinen-Wesen*, 1868, Vol. XVI., and written by Herr Illing: The lead to be treated is melted in a Pattinson kettle at a high temperature, until a piece of zinc floating on it fuses, when ⅓ of the whole quantity of zinc required is added, and when fused is thoroughly stirred into the lead over a strong fire, for twenty or thirty minutes, with a perforated ladle. The fire is then covered with wet coals and the kettle allowed to cool very slowly, when a dross-like mass separates upon the surface of the metal bath and is removed with the ladle. At the same time a crust forms on the edge of the kettle, which is also removed, and, like the other crust, consists of zinc, silver, and lead. These are removed as they form until the lead has become so cool that the crust on the edges forms too thickly, or the lead shows signs of crystallization on its surface. Thereupon the lead is again heated to the fusing-point of zinc, one quarter of the whole amount of zinc required is added, and the whole operation repeated; then the third portion of zinc, consisting of the remaining one twelfth, is added, and this time the zinc crust is more carefully and completely removed, until the formation of lead crystals is quite distinctly observed, and it is certain from experience that the lead is sufficiently desilverized.

According to P. Bergholz, the above operation is slightly varied at the works of Herbst & Co., in Call. The fusion of the lead takes place in a Pattinson kettle seven feet in diameter and twenty-two inches deep, which holds about 225 cwt. After it is melted the dross is removed, then the zinc is added, being as before about ⅓ of the whole amount required, and the stirring is continued for half an hour, while at the same time the fire is allowed to go down somewhat. When the lead has stood at rest until the zinc crust is three lines thick, this is removed until lead crystals begin to form. By this time about two inches of the metallic bath will have been taken off, and the kettle is then filled up with "liquation lead," the second portion of zinc is added, the crust removed, and the kettle again filled up with "liquation lead," and treated with the third and last portion of zinc. This "liquation lead" is obtained by heating the zinc crust, removed after the second and third additions of zinc in a kettle until most of the lead melts and runs out, when it is drawn off into another kettle and reserved to be used in filling up the kettle which contains a fresh charge of lead to be desilverized. This "liquation lead" contains 0.0125 % of silver and 0.6 % zinc, and we shall subsequently see what is the result of adding it to the original charges.

At Clausthal, in the Hartz Mountains, the charge of lead consisted of about 250 cwt., containing from 0.12 to 0.13 % of silver. The zinc was added in three successive portions, of 260, 100, and 40 lbs., and the resulting desilverized lead contained 0.0005 % of silver. An attempt to use 25 lbs. less of zinc resulted in lead containing 0.001 % of silver.

One of the most essential conditions of this part of the operation is to insure a thorough mixture of the zinc with the lead without oxidizing the zinc more than can be helped. About the year 1852, Lange invented an apparatus for passing the lead through a column of melted zinc, but it did not prove successful. At Pise and Havre the fluid zinc is allowed to ascend through the melted lead in drops or in fine streams. In the *Annales des Mines*, 1863, Vol. XIII., an apparatus is described which is used at Havre. It consists of a sieve-like perforated iron box, which can be put into rotary motion, and this, with the zinc inside it, is placed in the lead bath. The ascending drops of zinc are also dispersed through the lead by means of a fan-like arrangement, so as to insure a thorough mixture. Millan has proposed the use of electricity. After refining the lead in a reverberatory furnace, he brings it into a kettle where it is heated to about 1000° Fahr., or so that the hand can just be held within two and a half feet of its surface. After skimming off the dross which is added to the next charge of lead in the refining furnace, zinc to the amount of ½–½ % of the lead is added, and when this is melted and thoroughly stirred in, an electric current is conducted into the metal bath by means of 2–8 copper poles, attached to a Ruhmkoff's coil. The current (which causes a vibratory motion) is passed through for from ten to thirty minutes as required, until a zinc crust begins to form, when the fire is slackened and the current stopped. The zinc crust soon becomes firm, and should be removed at a temperature of 840° to 865° Fahr., and the operation repeated with the same quantity of zinc, two or three times, until the lead is sufficiently poor. This method is not likely to be adopted generally, since it is not certain that the result is due to the electricity, any more than to the stirring, which seems to be the chief point. Three additions of zinc have been found to desilverize the lead sufficiently. As regards the relative proportions of silver removed by the successive additions of zinc Herr Illing gives the following facts:

Assays of the lead taken at various stages of the desilverization at the Schliessemaar Works showed,

In the work lead when melted,	0.0283	% silver.
After the first addition of zinc,	0.0210	% "
" second " "	0.0050	% "
" third " "	0.00062	% "

At the Clausthal Works similar assays gave:

In the work lead,	0.1250	% silver.
After the first addition of zinc,	0.0250	% "
" second " "	0.0042	% "
" third " "	0.0005	% "

From this a curious and unexpected fact appears: namely that the rich lead is more rapidly desilverized than the poor lead, and Illing calls attention to the following as a possible explanation. Independently of the silver it may contain, the lead requires for its saturation a certain amount of zinc, which forms with it an alloy that has no affinity for the silver, but sets it free, and thereupon the excess of zinc combines with the liberated silver and can take up a considerable quantity before becoming saturated. It follows from this that the zinc crust removed after the second and third additions of zinc, is not saturated with silver, and may be used in place of fresh zinc to treat a new portion of lead.

By referring to the description given above of the process at the works of Herbst & Co., it will be seen that the addition of the "liquation lead" has the effect of saturating the zinc in the last two operations; so that in these works there would be no advantage in using the zinc a second time.

Analyses made at Clausthal from specimens of the Schliessemaar lead show that the zinc combines with the copper as well as the silver:

	1.	2.	3.	4.	
Antimony,	0.035	0.034	0.048	0.046	per cent.
Copper,	0.161	0.003	0.007	0.008	"
Iron,	0.005	0.006	0.003	0.004	"
Zinc,	0.006	0.227	0.541	0.777	"
Silver,	0.0283	0.021	0.005	0.00062	"

No. 1. Work lead.
No. 2. After the first addition of zinc.
No. 3. " second " "
No. 4. " third " "

The desilverized lead contains in this case less than 0.2 oz. silver per ton of 2000 lbs., a result which is quite satisfactory. It has now to be refined, since it contains enough zinc to make it useless for most purposes, and any antimony which was present remains also. While the desilverizing process has but few variations, the refining has been performed in a variety of ways, differing essentially from each other. The discussion of the various methods of refining the desilverized lead will form the subject of the next article.

[To be continued.]

Commissioner Wilson on Mineral and Agricultural Lands.

THE following communication from Commissioner Wilson was received in Sacramento, Cal., May 21st:

DEPARTMENT OF THE INTERIOR,
GENERAL LAND OFFICE, May 6th, 1869.

Register and Receiver, United States Land Office, Sacramento, Cal.—Gentlemen: This office has received a communication from John A. Tyler, of Grass Valley, Nevada county, Cal., complaining of the discouragements experienced by farmers in that neighborhood.

He states that the occupants of lands under cultivation from ten to fifteen years, constituting some of the finest farming-lands in the State, upon which no valuable mineral has ever been found in paying quantities, are deterred from erecting valuable buildings, setting out orchards, or making other improvements of an expensive and permanent character, from their constant liability to be destroyed or injured by parties of gold-seekers passing along, endeavoring to develop placer deposits beneath the surface of their fields; and that these evils must continue until the farmers are invested with complete titles to their lands.

There is no doubt that there are many tracts of lands in what are called the mineral districts of no value for mining purposes, but well adapted to agriculture and horticulture, and that their settlement and improvement by permanent residents would be a benefit, not only to the State, but to the General Government. It is not the policy of the United States to keep such lands open for exploration for an indefinite length of time, from the mere possibility that some day or other gold or silver, cinnabar or copper, might be discovered on them. No reason exists why such evils as are complained of should not be speedily remedied. He says much money, time, and labor are expended by farmers in trying to prove up and enter their lands; that combined efforts are made by speculators and men interested in keeping the country open for exploration to prevent them from obtaining title. You should endeavor to prevent unnecessary litigation, and improper and unnecessary obstructions being thrown in the way of making entry of lands that are more valuable for agriculture than for mining. If a tract of land, say forty acres, has a mine upon it, occupied and worked by the occupant thereon, in pursuance of the mining customs, there certainly can be no trouble in proving that fact, and it requires no tedious and expensive investigation to determine that such tract cannot be entered under the Preëmption or Homestead law. If, on the contrary, the adjoining forty-acre tract is well adapted to farming or gardening, has never had a mine upon it, or one that is now exhausted and no longer worked, and presents no positive indications of possessing valuable deposits of the precious metals, the facts are such as to be capable of ready proof, requiring no protracted examination, and the district officers should exercise much care to prevent unnecessary embarrassment and delay by combinations having selfish purposes in view, seeking to interrupt the regular disposal of the public domain. A certain subdivision either has a mine upon it and is occupied by miners in pursuance of the mining customs of the district, or it is not improved and occupied as a mine. In either case, the facts are obvious and susceptible of easy proof. If it is occupied as a mine, or if a vein of quartz or other rock in place has been traced through it, the tract is mineral land; but if it has no existing mine upon it, and no metalliferous vein of rock is known to pass through or penetrate it, the land is not properly classed as mineral, although, contrary to present indications, gold, silver, cinnabar, or copper may at some future time be discovered on it.

One part of a quarter section may be mineral land and another part of it only fit for agriculture, but it does not follow, from one forty or eighty-acre tract having mining improvements on it, that the other eighty cannot be entered under the Preëmption or Homestead law. Where a mine exists the miner should be allowed such an additional quantity of land as is necessary for the convenient working of the mine, but beyond this he ought not be allowed to interfere with the disposal of the public domain, and if the residue of a quarter section is farming-land it should be disposed of accordingly. These questions of contest, it is supposed, generally arise upon land claimed to contain placer deposits, but upon which no placers have yet been opened, but if once opened are no longer worked. Lands containing mineral veins or lodes are usually of such marked geological structure that one would suppose no great amount of litigation could grow out of adverse claims by agricultural settlers. Besides, under the local customs, vein miners are only allowed a certain number of feet on each side of the vein or lode. If beyond such distance no other veins are found, and the land is adapted to farming, the miners certainly have no right to prevent agricultural settlers from improving and entering it. The mining interest does not require that lands not occupied and worked for mining purposes should continue as public domain. Even mining-lands are sold to individuals under the mining law, and the Government of the United States has the same right to dispose of its agricultural lands as it has to sell its mineral lands. The rights of miners are limited to lands occupied by them according to the mining regulations; it is not perceived what rights they have to the United States lands not thus occupied, or why they should undertake to interfere with their disposal. Lands not occupied for mining purposes, and not traversed by veins of quartz or other rock in place, bearing gold, silver, cinnabar, or copper, are classed as agricultural lands, if adapted to such purpose, and they do not take the character of mineral land merely from being surrounded by lands of that class, nor from the possible fact that "shallow placers," or "deep-diggings," or blind lodes may at some future time be found beneath their surface.

The policy of the Government is to dispose of its domain to industrious and permanent settlers—one class of land under the Mining Act, and the residue according to other statutory provisions. Even an occasional mistake by disposing of tracts containing placer gold, under the Homestead or Preëmption law, but not occupied for mining purposes at the time, nor known to contain gold in sufficient quantities to render them more valuable for mining than farming, would be a less evil than to discourage settlement and improvement by keeping open for indefinite exploration large sections of country well adapted for farms and gardens. If gold should afterward be found in paying quantities there need be no fear that it would be suffered to remain unmined very long; and the fact that the miner in that case would not be a mere temporary occupant of the land, but a permanent settler and improver of the soil, would certainly not be to the prejudice of the State or National Government. You are directed to afford all proper facilities for obtaining titles to their lands to *bona-fide* settlers upon lands more valuable for agriculture than for mining, taking care not to interfere with the mines or mining improvements of mining occupants. Wherever the character of a tract applied for by an agricultural settler is contested, you will have an examination of the case, requiring the applicant to serve notice upon the contestants, which may be done by posting *written* notices at several prominent points, to be designated by you, in the vicinity of the land, or by publishing notice in the newspaper nearest the land in dispute.

You will apply at this office for any further instructions you may desire, and report promptly all contested cases, that they may be disposed of without unnecessary delay.

Tyler will be furnished with a copy of this letter.

Very respectfully, your obedient servant,

JOSEPH S. WILSON, Commissioner.

The Mines of Colorado.

TO THE EDITOR—SIR: The mines of Colorado are divided into various classes. The first thing a truly scientific observer attempts is classification, and it is a matter of great importance to determine upon what principle this classification shall be made. After studying the works of various learned predecessors, and examining for myself the country rock, selvages, gouges, casings, gangue, ore, faults, slicken sides, upheavals, metamorphism, decomposition, and general structure of the mineral deposits of this Territory, I have come to the conclusion that, in spite of all previous theories, the mines of Colorado belong to the following classes:

1. Those that always did pay, and always will.
2. Those that didn't once, but do now.
3. Those that did once, but don't now.
4. Those that don't now, but will.
5. Those that never did and never will.

Of the first class, I regret to say, neither history nor experience gives us any example. If we had taken the contract to create the world, no doubt we could have arranged that matter better; but Nature operated without reference to dividends, and when she patiently, through countless ages, collected her treasures in the rocks, seems not to have suspected that avaricious man would charge four dollars a day for the pleasure of taking them out again. Or else, perhaps, she mistook the relative value of things, and expected us to spend our labor in saving the quartz and throwing away the gold. If this was her anticipation, I confess we have done a good deal to confirm her in that error. Let us console ourselves with the thought that if gold were as plenty and as easily gained as quartz, it might be as cheap; and as long as its scarcity and difficulty of extraction render it valuable, let us not imitate good Mrs. Partington, who complained that "there never wuz sech contrary critters as hens, allers a layin' when eggs wuz cheap, and allers a dryin' up when eggs wuz dear."

Of the remaining four classes, the last is the only one upon which I can speak with certainty. Mining is a business, full at best, of difficulties and risks; and it is the part of wisdom to secure at the outset as many of the chances as human foresight can perceive, or human skill control. When a man engages in this business with all the chances against him, it requires no prophet to foretell the result. Among the mines which never did pay and never will, I unhesitatingly include those that have no existence. This paradox you comprehend. We have had in Colorado a great many Hamlets with Hamlet left out. It need not be said upon what shoulders the blame should fall. Perhaps it is about equally divided. If our New-York speculators have badly burnt their fingers, some of the miners have been well plucked in return. It is but seldom that my sympathy is touched on either side. All speculation aims at getting a thing for less than it is worth, and selling it for more; and pure mining speculation—the system which looks, not to the steady development of a country, but to shuffling off the burden of its development upon successive shoulders—is not deserving of success. The purchaser of stock in one of these paper companies is only anxious to raise the value of the stock and get rid of it; and often he is a fool, because he tried to be a knave, and failed. It is like the "pocketbook game" in our Eastern cities. If the stranger upon whom it is tried is a thoroughly honest man, it fails; but if he is just sharp enough to pay twenty dollars for the chance of getting a hundred out of the pocketbook skilfully left for him to find, he falls a prey to his own acuteness and unscruplousness, and we do not pity him when his prize turns out to be brown paper, tipped at the ends with counterfeit notes.

Now, the failure of all these enterprises of the imagination is easy to explain. Man's will is not omnipotent, but some things it can always compass; and when nobody means that a certain enterprise shall succeed, you may be sure it will not succeed.

With regard to the other classes of mines I have mentioned, the most important questions that can be asked are: "How came those that once were profitable to fail? What is the secret of the present success of others? How can many now idle be restored to an active and fruitful condition?" To these questions there are no general and universal replies. You might as well ask why one merchant fails and another succeeds. Some merchants ruin themselves by their own extravagance and incompetency; some embark in a business in which failure is a foregone conclusion, circumstances being from the outset against them. If we consider, however, the maxim, abundantly illustrated, that bad management will ruin any mine, however valuable it may be, we may say with confidence that bad management has done more to injure mining in Colorado than all other causes together. And this bad management has been four-fold—in laws, in the extraction of ores, in the reduction of ores, and in general finance. Here, too, the blame must be divided. Incompetent agents have doubtless wasted money, but they have generally acted under advice. Scientific men, so called, have made stupendous mistakes of judgment; but they have been surpassed by the blunders of the practical men, so called. The scientific men without practice and the practical men without science, the honest men without capacity, and the smart men without honesty, have done so much to destroy the mining industry in Colorado, that the very fact of its continued existence, after so terrible a trial, is proof of its inherent vitality and future prosperity. This year marks the new era of mining in Colorado. The old spirit of idleness and speculation has passed away. The new spirit of labor and economy has sprung into power. It is beginning to be recognized that the men to develop the resources of a country are the men who live in it; that the foundation of wealth is labor, and that only; that capital is only the hoarded labor of the past, loaned to the labor of the future; and that, under all, before all, above all, if there is to be progress, there must be work! In the face of this new spirit, surrounded by this new atmosphere, I feel encouraged to discuss a question which, in former days, could not, perhaps, be impartially considered. What is the relation of the government to the mining industry upon the public lands? What should be its policy in the interest of the whole country? What can it do, without transcending its proper sphere, to assist the miner and protect the treasures of the land? As I understand the subject, the Government should give the miner four things: communication, protection, regulation, and information, and of these I may speak more at length hereafter. R.

DENVER, COL., June 19th, 1869.

Queries.

DENTIST, OF NEW-YORK CITY, asks: "Does not common street-gas answer as well as hydrogen for the oxygen blow-pipe, as well for melting platinum as for calcium-lights, for which it is now exclusively used?" No; it may perhaps do for platinum, but Deville and Debray found that with it they could not melt iridium, which has a higher melting-point than platinum; however, when they used pure hydrogen with the oxygen, they succeeded in readily melting iridium metal. Before that, Jacobi had only succeeded in melting it in the galvanic current, and exhibited lately in Paris an iridium bar of a weight of 267 grammes (over half a pound).

W. H. W. OF OHIO, asks: "If wheels of different sizes, fixed to an axle, will run on straight parallel rails without one of them slipping." Not only will there be slipping, but, by the least resistance to this slipping, they will run from the track, by their tendency to run in a circle, of which the centre is the top of the cone, which you can imagine to touch the circumference of both wheels.

C. R. M., OF N. Y.—Your suggestions are new, excepting those for the use of steam for towing boats in canals. This plan has already been advantageously adopted in many parts of the world.

MINING SUMMARY.

California.

THE "GIANT POWDER" STRIKE.

THE San Francisco *Bulletin*, June 18th, has the following touching the mine stoppages in Nevada County on account of the introduction of the new blasting powder dynamite by the managers: By inadvertence the statement was made in yesterday's *Bulletin* that the Eureka mine, at Grass Valley, had suspended operations since the strike. The North Star was the mine intended to be named. The Eureka has not adopted the new explosive except for blasting boulders, and is still running on black powder. Since our comments of yesterday the Empire, which was trying to get along with less than a full complement of hands, has discharged all but enough to keep the mine drained and stopped. The Allison Ranch mine has also closed. Thus three of the most productive mines in the district have ceased operations, as a consequence of the attempt on the part of employees to dictate their management.

The San Francisco *Mining Press* says of the strike in Grass Valley: The chief mining feature of the past few days has been the strike at Grass Valley, where the miners have leagued together, to the number of some three hundred and fifty, to resist the use of Giant Powder and single-hand drilling in the mines. They have had several meetings—some public, others secret—and "resolved" to do all in their power, "honorably, if possible, forcibly, if compelled; *not to allow* any of our fellow-citizens to use the murderous Giant (powder) in the County of Nevada." They have also "resolved" against the use of "single-handed drills." Now, as single-handed drills and Giant Powder will reduce the number of men engaged in getting out hard rock one half, it is suspected by the mine owners that it is really "what's the matter," instead of detriment to health—the plea actually put forth. If such is not the case, why any need of reference whatever in the resolutions to "single-handed drill?" They certainly do not affect the health.

The miners have evidently been led into a false and untenable position by injudicious leaders. So far as protection to health is concerned, it is a very proper subject to inquire into; but the steps adopted are not at all likely to help the matter. So long as men can be found who are willing to use the Giant Powder, it is the right of the mine owners to employ them; and if full experience shall prove that its use is seriously detrimental to health, both owners and the miners will very soon find it to their interest to discontinue it.

The local papers and citizens of Grass Valley, generally, are in sympathy with the mine owners. Two of the principal mines—the Empire and North Star—have closed work, and discharged some three hundred and fifty men, and negotiations are pending with miners in other sections of the States for men who are not so tender-skinned on the powder question. The excitement is great, and the interests of the entire community are more or less affected. The miners who oppose the use of the powder have an undoubted right to quit work; but the whole power of the State will be arrayed against them if they attempt to prevent others, as they say they will, from taking their places in the mines. It is to be hoped that better counsels will prevail, and the old hands, many of whom have families and homesteads in Grass Valley, will consent to go to work again, and wait for a proper time and proper measures to abate the evil complained of—if, indeed, any evil shall be found to actually exist.

REDUCTION OF ORES BY ELECTRICITY — THE PIOCHE-NOLF PROCESS.

AMONG several other, what may be called *new processes* for the reduction of ores, now claiming the attention of metallurgists on the Pacific coast, stands conspicuously forward the Pioche-Nolf process. We find in a San Francisco paper a favorable account of it, which will undoubtedly interest many of our Eastern readers. It reads as follows:

"In the early part of January last we published a description of a new power of working rebellious ores by the aid of electricity, invented by Messrs. F. L. A. Pioche and A. L. Nolf, of this city. The principle of the new process was suggested by the researches of M. Becquerel, the celebrated French chemist, who had for many years devoted himself to the investigation and analysis of the existing processes for reducing rebellious ores. In perfecting their apparatus, however, Messrs. Pioche and Nolf found it necessary to modify and alter the suggestions of M. Becquerel, that they are fairly entitled to the credit of having discovered a new principle, which they have applied with signally successful results. During the time that has elapsed since the publication of our first article on this process, the inventors have so far simplified their arrangements as to reduce the cost of working to a minimum. The changes that have been made are, however, not of a character deemed proper to make public at this time. It is of course in the results of the process that its value must be found; and as these results are the best criterion of its merits, we shall proceed to lay them before our readers.

"A quantity of ore from a mine in Mono County, the rebellious and intractable nature of whose mineral productions is well known, was procured for the purposes of the experiment. It amounted in all to 7235 pounds, and it was a class of ore that had been offered for sale at 70 per cent of its presumed value, without finding purchasers. The apparatus being prepared, the experiment was commenced, and during a period of twelve days, 600 pounds of ore was reduced every twenty-four hours. The result of the cleaning is fifty-five pounds of silver, or at the rate of from $318 to $330 per ton. The fineness of the retort amalgam is 980, or nearly pure silver. With an imperfect washing it yields 85 per cent of precious metal, and the amalgam is the prettiest, finest, and best that we ever remember to have seen. A peculiarity of the new process is that it crystallizes the amalgam, without aggregating the particles, showing that the action is purely chemical, and not mechanical.

"And now we come to the most important question in relation to the invention—namely: the cost of its application. Leaving on one side the expense of erecting a steam engine, which is necessary in all mills—no matter what the process used, the Pioche-Nolf process costs two dollars per ton of ore for chemicals. In the twelve hours, three hours of mechanical work are alone needed; and during the remaining nine hours, the application is purely chemical. The chemicals for working six hundred pounds of ore do not cost more than sixty cents. The cost of apparatus sufficient to work one ton a day is estimated at about $80, and the same for all quantities above one ton.

"Another striking feature in the new process is the fact that when several vats are employed, no batteries are needed, the vats themselves being, by a skilful adaptation, made to supply the requisite current of electricity for themselves and each other. The process is so simple that very little watching is needed during its application; and, as we have said before, only three hours of mechanical work is necessary during a day of twelve hours.

"The news of this invention has been transmitted to Paris, and was received by M. Becquerel with the deepest interest and the sincerest pleasure. He lost no time in announcing to the Academy the triumph of Messrs. Nolf & Pioche, and while recognizing the importance and the scientific value of their discovery, disclaimed, with the modesty of true genius, the credit which his disciples insisted was his just due. In stating the case before the Academy, M. Becquerel, alluding to Messrs. Pioche & Nolf, observed: 'These gentlemen have informed me of their success, and wish to attribute to me all their merit; but I can yet speak of it only with reserve, because it is necessary to know the working expenses, and to compare them with the old method. In any case, I desire to call public attention to a subject of such great importance to all mining districts.' M. Becquerel was, of course, perfectly right in hesitating until he was acquainted with the cost of the process. That is always the chief feature to be considered in regard to new inventions. But we are inclined to think that the statistics of the expense of working, which we have given above, will satisfy not only M. Becquerel, but all practical miners and scientific men, that the invention of the Pioche-Nolf process is destined to be a benefit to the age, and very certainly to all mining countries."

CALIFORNIA SLATE.

THE production of slate for roofing and manufacturing purposes in California, is one of the most prominent forward movements in that thriving State of recent date. To what extent, and by whom this branch of industry is developed, is thus briefly told by the *Commercial Herald* of San Francisco:

"A large quantity of California slate was exhibited at 331 Sacramento-street yesterday. The specimens were from the quarry of the California Slate Company, at Alvord City, in Calaveras County. This quarry, which was discovered about three years ago, is the first that has ever been opened in this State, and now produces the very finest specimens of smooth-splitting slate, entirely free from pyrites, and which can be cut into any required form without waste. The owners of this new production of California are S. F. Butterworth, L. A. Pioche, William Alvord, and L. L. Robinson, who are about to incorporate. They have leased Flint's wharf and warehouse, and will furnish slate in any quantities for roofing, flooring, siding, paving, table-tops, mantles, etc. Messrs. Hughes & Stahle, billiard-table manufacturers, have given to the new company their first contract to supply all billiard-beds required. At the mines the company have a large boarding-house for the accommodation of their workmen, and use the most improved appliances in their mining operations. They have gone down about thirty feet, and in all cases find the slate of easy access. Shipments will be made by way of Stockton to San Francisco."

Colorado.

THE PRESENT PROSPERITY AND FUTURE OF GILPIN COUNTY.

CONTRASTED with the dull times of 1866-'67, the aspect of affairs in the mining districts of Colorado is decidedly cheering. In Gilpin County especially, a tone of confidence pervades the whole community. The bullion yield of the mines is constantly increasing—indeed, well-informed persons predict that the gold product this year will nearly double that of last. The Denver *News* thus reviews the field: Mining Affairs in Gilpin County never looked more promising, or were never being prosecuted on a better or more substantial basis. During the slack times in the winter, more stamps were run and more gold produced than for any similar season during four or five years. At the earliest approach of spring, operations at once began to increase, and the prospect for the present season is one at which every one in Colorado must rejoice. Already some nine hundred stamps are running, and the shipment of bullion for May is reported at $238,000. This is done with some five or six large companies doing either nothing or the next thing to it. Professor Hill is being supplied with all the first-class ores he can handle, and it is not improbable that he will increase the capacity of his works. The miners who were at first loth to sell him ores, are now finding out that it is the best thing they can do, and that they can make more money by selling to him than by disposing of them in any other way. This fact is one of the most encouraging in the present aspect of Gilpin County affairs. Another fact of importance is the negotiation going on for the consolidation of all the companies on the Bobtail mine, and placing the property under one management. This was suggested in the *News* last winter, and the necessity of its final accomplishment is plain to all who are familiar with the facts.

AMONG THE GEORGETOWN MINES—THE TUNNELLING SYSTEM.

MR. THOMAS, mining editor of the Denver *News*, is travelling among the mines around Georgetown, and writing about them in his paper. We extract the following interesting facts in regard to the tunnelling system, now in process of development there, from one of his letters dated June 2d. He says: The first tunnel worthy of mention is the Marshall Tunnel, under Leavenworth Mountain. The company owning it was organized in 1868 by F. J. Marshall, Esq., nearly all of the stock being taken in Georgetown, Central, and Denver. Of the capital, which was placed at $150,000, $60,000 was used in purchasing lodes on the mountain, which would be cut by the tunnel. The balance was reserved for the purpose of developing the property and driving the tunnel, on which work was begun last fall. It has now reached a distance from its mouth of two hundred and twenty-five feet, and is being driven at the rate of two feet per day, which will soon be increased to from three to four feet. It is the intention of the company to drive the tunnel through the entire mountain, a distance of three thousand nine hundred and twelve feet. It will cut at various depths, some thirty lodes now discovered, many of which, like the Equator, Herkimer, and McClellan, are of known and celebrated value. The rock in which they are now working is soft, and requires but little blasting; the Burleigh drill will be used. The expense of driving it is now only $26 per foot. At the mouth of the tunnel a complete set of dressing or reduction works can be erected, with as fine a water-power as there is in Colorado. The company expect to be three years in completing their work; but long before that time they will have crossed many rich, paying veins, the ore from which will be yielding a handsome dividend on their stock, which by that time will doubtless be increased to an amount commensurate with the importance and greatness of the enterprise. The Compass and Square lode will be cut in about seven hundred feet, when the company believe they can take out ore enough to pay the whole expense of driving the tunnel, and a good dividend besides. The other three tunnels are all being run under Sherman Mountain. The first is the Burleigh tunnel, on which work is being prosecuted by a company of the same name, and under the management of Mr. Burleigh, one of our most enterprising capitalists. The rock is of a very hard character, which renders the use of the Burleigh drill necessary. The tunnel is now run for a distance of about seventy feet, and work on it is being pressed with vigor. It will cut in its course through the mountain many celebrated lodes, at great depths, among which are the Terrible, Brown, Coin, Lillie, and others. The Goss tunnel is some two miles above the Burleigh, and is running for the same tier of lodes on Sherman Mountain. It is now driven under the mountain for seventy-eight feet, and work on it is progressing satisfactorily. The remaining tunnel is the Terrible tunnel, running to cut that celebrated lode, and will be noticed hereafter, in proper connection. At present I wish to call the attention of the public to the greatness of these tunnel enterprises, and to the new era which their completion will open in silver mining. The Marshall tunnel cuts one half the Georgetown silver belt, and the Burleigh and Goss tunnels the other half. They will cross all the known lodes on Summit and Sherman, and no one can tell how many more will be discovered. Striking the lodes at such great depths, the tunnel at once develops them, and opens an opportunity for profitable mining, unequalled in the history of the world. When the small expense of back stoping the ore, and delivering it in a car at the mouth of the tunnel, with no cost for drainage, is compared with that of sinking shafts, hoisting the ore, and transporting it down the mountain, and of draining the mine with pumps, it leaves a difference in favor of the tunnels, which of itself would pay a fair dividend on any reasonable amount of stock. Noticing the great number of lodes which these tunnels will open, it will be seen that their completion will at once increase the supply of ores, and consequently the yield of bullion to an extent not now to be estimated. Low-grade ores can then be mined and worked with profit, where at present, with the cost of mining and transportation down the mountains, it is not possible to handle them. These tunnels I therefore regard as the key to successful silver-mining in this district. I do not mean to be understood that it is not a success now, but when these tunnels are completed the impetus to mining and the increase in the bullion product will be so great that all our present operations will appear small in comparison.

Wyoming Territory.

THE SWEETWATER MINES.

A CORRESPONDENT of the *Tribune*, writing from South Pass City, June 1st, upon the Sweetwater country, gives the following interesting information:

"Sweetwater, as the name of a stream, has been more or less peculiar to the people of both the Eastern and Western States, ever since the first tide of emigration flowed across the plains and mountains to the Pacific Coast in 1849. The Sweetwater Mine is now fast becoming an equally familiar phrase throughout the West, and to some extent, no doubt, in the East. In order to reach these mines from the States, a journey by rail is necessary from Omaha, eight hundred and three miles westward, to a station on the Union Pacific Railroad called Point of Rocks, or eight hundred and fifty-seven miles to Bryan City. There is a line of stages running from each of these points to South Pass City and Atlantic City, the two leading towns, and, with Hamilton City, the only towns of this vicinity. The distance is less from the first-named station, but the proprietors of the line from the other claim the best road. I left the road at Point of Rocks, and found the stage accommodations across as good as could be expected in this country, and the employees courteous and obliging.

"The mines are situated near the summit of the Rocky Mountains, seventy miles from Point of Rocks. A large portion of the country from the railroad across to this point is an alkali country, with but little vegetation, except the sage, brush, and greasewood, so familiar to the mountaineer. A few miles before reaching this point, however, a small stream, a tributary of Sweetwater, of pure, cold spring or snow water, furnishes the traveller a welcome draught, which, after the alkali-embittered water he has been obliged to use, is positively delicious. The country in this region consists of small valleys, elevated plateaus or table-lands and hills of all degrees of abruptness, from the gentle swell of the prairie to the perpendicular wall of solid rock. There is considerable land with a soil suitable for agricultural purposes, but no rain falls in summer, so that irrigation would be necessary if any body undertook farming. There are several streams, from twenty to fifty miles distant, running through beautiful valleys, in which agriculture has been successfully carried on. Hostile Indians have almost compelled the desertion of these valleys, but a few hardy pioneers remain.

"South Pass City is situated upon Willow Creek, a tributary of Sweetwater, near the pass from which it takes its name. It is supported by several rich mines in its vicinity, and it is the seat of government for the County of Carter, in which it is situated. Its population at present is about 400, and rapidly increasing. Atlantic City, four miles in a direction a little north of east from South Pass City, is the business and commercial centre of a neighborhood comprising several rich quartz and placer mines. It is situated upon Rock Creek, and has a population of about 300. Four miles further north, upon Beaver Creek, is Hamilton City, a small aggregation of settlers, the main point of attraction being a very rich quartz lode and gulch of placer mining, which promise employment for the population there, numbering about 100. Three miles beyond Hamilton the traveller reaches a small stream with a fertile valley, adapted to agricultural purposes, called Little Po-pe-argie. This is the first and smallest of three valleys in which agriculture has been successfully engaged in. The next is Big Po-pe-argie, fifteen miles from the first, and Little Wind River, still fifteen miles further. These valleys have an exceedingly fertile soil, and when permitted by the Indians, settlers will make agriculture profitable. Currants, gooseberries, raspberries, blackberries, strawberries, cherries, plums, and apples are plenty. The streams teem with excellent fish. Trout of the finest flavor, and other varieties of fish almost as good, are abundant. These valleys and the surrounding mountains furnish a variety of choice game. There are deer, elk, antelope, mountain sheep, moose, buffalo, and several species of bear—the cinnamon, brown, grizzly, and black bears.

"These streams are tributaries of Wind River, which, with other

and larger tributaries, form Big Horn River, and running a direction somewhat east of north, empties into the Yellow Stone. All of these streams are timbered with cottonwood and quaking-asp. Commencing near the foot of the mountain there are forests of fir, white pine, and yellow pine. In the valley of Wind River is a warm spring, tinctured with sulphur. Near this there is a spring furnishing oil, which will burn in a lamp similar to coal-oil, which it no doubt is. There is also another spring, from which wells up a substance which, to all appearance, is pure tar. It dries upon the earth around, and is used as fuel. Native asphaltum can be obtained in any quantities. The valley contains a ledge of marble which cannot be surpassed in quality anywhere, besides slate suitable for roofing; sand-rock, fine and coarse, adapted to the manufacture of grindstones, whetstones, etc., and a fair quality of coal. These, with other great natural resources of this region, have been shut off from development, and almost from the knowledge of the white people, by the determined hostility of the Indians, mainly Sioux. I was badly wounded and crippled in the valley of the Little Wind River less than a year ago, in an encounter with half a dozen of them.

"But these resources, great as they are, cannot compare in importance with the rich quartz lodes on different tributaries of the Sweetwater. This region also contains many rich placer or gulch mines, some of which are worked at a profit of from $5 to $25 per day the man, but being so near the summit there are many rich gulches which cannot be worked for want of water. It is the quartz lodes upon which the prosperity of the country depends. They are permanent; they are rich; they are productive and apparently inexhaustible. New ones are being discovered every month. And yet a large portion of the country which is known to contain quartz and placer mines cannot be prospected on account of the red man."

Canada.

THE SILVER MINES ON THE NORTH SHORE OF THUNDER BAY.

TO THE EDITOR—SIR: The glowing accounts of the immense deposits of silver in the White Pine District seem to have entirely overshadowed the rich mineral regions of Lake Superior and other portions of the great Northwest. As I have just returned from a very delightful trip to Fort William, on the north shore of Thunder Bay, I have thought that a short account of what I saw and heard while there might not be uninteresting to some of your readers, and might induce some men of capital to take the trip, if for nothing else than for the pleasure of seeing the vast mineral resources of that (as yet) comparatively unknown country.

Silver was discovered on the north shore of Thunder Bay in 1867; and since that time large tracts of land have been surveyed and taken up by men of capital, and two companies are now quietly at work mining for the precious metal. The Thunder Bay Mining Company, composed of some of the heaviest capitalists of Montreal, have been working their vein for over a year. They have all the machinery necessary for mining on a large scale on the ground, and are now erecting their stamp-mills. They have about one thousand tons of ore ready for crushing. It was hauled down last winter from their shaft, which is only two and three quarters miles from the Bay, where they have built a fine dock, at which a vessel drawing from twelve to fifteen feet of water can land. This company seem determined, however, to keep their business entirely secret, and all the information concerning their doings must be obtained (if obtained at all) from the miners or outside parties. I was told that they had barrelled and shipped about twenty-five tons of ore, which would yield 20 per cent of silver. I was shown a specimen of two hundred pounds in weight, which would yield fully 50 per cent of pure silver; and I succeeded in obtaining a specimen of that kind myself, which I am satisfied will yield from 40 to 50 per cent of silver. Their gentlemanly Superintendent, Mr. McDonald, did all in his power to make my stay as pleasant and agreeable as possible; but positively refused to give me any information as to what they were doing; neither would he let me have any specimens of their rich ore, as he said it was positively forbidden by his company. Mr. McDonald was manager of the silver mines in Norway for about twelve years, and was brought from there by this company about one year ago. He expressed himself highly pleased with the prospects of this vein.

The Shuniah Mining Company, composed of gentlemen from this side of the line, commenced to mine on their property in the summer of 1867, and have sunk a shaft sixty or seventy feet deep, from which they have taken some very fine ore. Their vein is from twenty to twenty-three feet in width, and native silver, I am told, has been found on the surface wherever the earth and moss have been removed from the back of the vein, which in most places is not more than two or three feet in depth. I made a small opening myself with an explorer's pick, and took out a small piece of ore, weighing only 3 ozs. from which I extracted 1 oz. 3 pwts. of pure silver, which I have since had made into a teaspoon.

It is a matter of surprise to me that men of capital in New-York and elsewhere in the United States have not given more attention to this country, instead of sending their money to the almost inaccessible regions of Nevada, Colorado, and Montana, especially since the heretofore short-sighted policy of the Canadian Government has been changed in regard to mines and mining for the precious metals. By an act of the last Parliament of Canada, the imposition of all royalty, tax, or duty on gold and silver was repealed, and now the country is open free to all, on the payment of one dollar per acre (the Government price) for the land. It is my opinion that persons seeking investments of capital can find no more promising opening, and it only requires an inspection of the country to convince any reasoning man of the correctness of my assertions. There are now two fine steamers on the route (the *Algoma* and *Chicora*), one of which leaves Collingwood (the terminus of the Northern Railway of Canada) every Tuesday on the arrival of the morning train from Toronto. The fare is only $30 from Toronto to Fort William and return. The round trip is made in ten days, and I will give it as my opinion that a more delightful trip cannot be found on this continent.

To sportsmen, I will say that finer speckled trout-fishing can be found nowhere. I have myself taken them weighing from two to six pounds from the McKenzie, a small stream which empties into the bay a short distance from the landing of the steamer, and in such quantities that it almost ceases to be sport. The climate cannot be surpassed; the Northern Lights are nowhere more beautiful or brilliant, and twilight lasts until nine and ten o'clock at night, and no man can spend a week there without being benefited in health and strength; and invalids and persons in delicate health will come away "almost as good as new." I believe this is where the saying "We have to kill a man to start a graveyard" originated. Instead of spending so much money at such places as Saratoga and Newport, let some of the "heavy men" of New-York take a trip to Lake Superior, north shore, and combine business with pleasure, and, my word for it, they will not regret it.

CINCINNATI, July 1st, 1869. D. P. McK.

Pennsylvania.

THE COAL-MINERS' STRIKE—RESUMPTION OF WORK.

THE Mauch Chunk *Gazette*, July 2d, has the following relative to the affairs in the coal-mining districts:

"The total amount transported over both railroads and the canal, last week, was $39,352.25, an increase of $30,841.07 over the week previous.

"We may now safely say that, with the exception of the collieries in the upper part of Luzerne County, work has been very generally resumed. At the collieries of Messrs. Linderman & Skeer, at Stockton, Luzerne County, terms satisfactory to both parties were arranged on Monday last, and on Tuesday the miners went in. At Jeansville work was begun Monday. On Tuesday work was also resumed in the mines of W. T. Carter & Co., at Beaver Meadow, and the mines of Coxe, Brothers & Co., at Drifton. At the Yorktown mines, three miles from Hazleton, we are informed, a satisfactory arrangement was made early in the week, and it was understood on Tuesday that work was to begin as soon as a sufficient number could be recalled from Schuylkill and other regions, whither they had gone to work temporarily. Messrs. A. Pardee & Co., at Hazleton, have agreed with their men, and the latter were to begin work yesterday. The basis arranged was sixty cents per ton when coal is $5 per ton at either Hoboken, Elizabethport, or Port Johnson, and twelve and a half per cent on all advances. Substantially the same terms are being allowed by most of the other companies in the vicinity of Hazleton, and it is thought that nearly all the collieries in that region will resume by to-morrow. The same may be said of the Mauch Chunk region. Consultations were held on Wednesday with the men of the Lehigh Coal & Navigation Company, at Summit Hill, but up to the hour of going to press, no determination had been arrived at. We are informed that the basis asked by the men is fifty cents per ton when coal is $5 at Elizabethport, with ten per cent on all advance.

"In the Lackawanna region, we are informed, no collieries are now working except those of the East Boston Coal Company, near Scranton, and of the Pennsylvania Coal Company, at Pittston. The men of the latter have remained at work throughout the whole period of suspension. A week ago there was talk of a strike among them to secure a basis, but this was finally obviated by a promise on the part of the Company to grant them the same advance, or other compromise that may be given by the Delaware, Lackawanna & Western, and Delaware & Hudson Companies, and allow the benefit of this from June 1st, 1869, no matter how long a time shall elapse before these companies agree with their men."

The *Luzerne Union* says:

"The miners are all at work in this vicinity, and there is a noticeable revival in business of all kinds. Transportation of coal by rail and canal is becoming heavy, and within a very short time will be up to the usual standard. In the upper part of the county, matters do not appear to be as satisfactory. The 'basis' question seems to be as far from settled as ever, and appearances favor the idea that the struggle between the workmen and corporation will be long continued and uncompromising."

The following is from the Wilkesbarre *Record of the Times*, June 30th, 1869:

"Schuylkill County has succeeded in checking, if not quite checkmating, the Lackawanna region, and now resumes work with a chuckle of satisfaction. . . . At Pine Ridge a meeting was held on Saturday, and only three votes opposed going to work on Monday morning. On Monday another meeting was held under the trees, and it was thought they would go in on Tuesday. The three held out for fifteen cents instead of ten cents advance on a car. In the evening an offer to 'split the difference' was made, but Mr. Fellows made no reply, and the works were idle yesterday."

It was reported several days ago that but one colliery in Northumberland County was idle.

Minnesota.

THE VERMILION LAKE GOLD MINES.

FROM the *Minnesotian* we learn that a party arrived at Duluth from Vermilion mines, the 8th of June last, having footed it the entire distance over the new State road, occupying five days in making the journey. They report the road in good condition, with the exception of a few much-needed bridges. There is nothing to prevent a man on horseback from riding clear through. We quote as follows:

"We learn from Mr. Clary that prospects of success for the mining operations, stamp-mills, and workers of the different processes for reducing the gold and silver ores from their sulphurets, were brightening considerably. Colonel W. H. Nobles had got all his machinery working; his steam-engine, five stamp mills, two furnaces, and four amalgamators were in excellent running order; and he had stamped out about five tons of gold and silver quartz, but had only put partially through the chemical process one small batch, with a considerable amalgam product, but of value not yet ascertained when our informant left. The Colonel was quite hopeful of great final success. He had an incline shaft thirty-two feet in depth sunk on the Tindall vein, and about two hundred tons of ore out ready for stamping.

"At the works of E. Seymour (situated at 'Winston City' Town Site, on Vermilion Lake) there were up the saw-mill, engine, and two of Humphrey's roasting desulphurizing furnaces. He also had the burr stones in operation for grinding the roasted quartz; as Mr. Clary says, 'they worked splendidly.' A portion of this quartz powder had been submitted by L. Deitz to the Tindall chemical process with highly encouraging results in gold, so that all hands at the mines were in great state of joyfulness thereat. Mr. Clary could not give us the exact particulars.

"The Watertown miners, over at Secret River Falls, were still working away with their three-stamp water-mill, and had been over to what is called the 'New District,' and had obtained there much encouragement.

"The sum and substance, therefore, of the news brought by Mr. Clary, an intelligent, working miner, is, that the prospects for the Vermilion Lake Gold Mines are just now very promising, only needing perseverance to ensure rich results and a deserved reward to the hardy and determined men who have been the pioneers of the enterprise."

Michigan.

THE ONTONAGON DISTRICT COPPER MINES.

TELEGRAPHIC correspondence from Ontonagon, dated June 23d, reports that a dulness, almost disheartening, pervades the mining community. At one or two of the mines, however, affairs wear, in some respects, a somewhat brighter aspect.

The Aztec is looking exceedingly well at the bottom of No. 2 shaft, and also on the second level, between Nos. 2 and 3. It is reported that the new machinery, which has been lately put up, is working in a very satisfactory manner.

LAKE MACHIGUMMI IRON DISTRICT.

IT is with no little satisfaction that we chronicle the fact that the work of exploration is being prosecuted with considerable determination on lands lying in the immediate vicinity of the west end of Lake Machigummi, with a view to an early commencement of mining thereon.

The Marquette *Mining Journal* says: "One of the most valuable discoveries made is on section 24 T. 48 N. R. 31 W. The ore found is magnetic, and from competent and reputable gentlemen who have seen the deposit, we learn that it is one of the few natural mines in this country. The ore outcrops on the top of a hill, which has a height of some 70 or 80 feet, with every appearance of not only having a considerable length, but also of being quite solid and regular. Extensive explorations and examinations have been made on property comprised in sections 36, 34, 28, 20, and 18, T. 48 N. R. 31, also on section 2, T. 47, N. R. 31, with results sufficiently encouraging to satisfy the most sanguine. The splendid hard wood and pine timber convenient to Lake Machigummi, especially at the west end, renders the latter point peculiarly adapted for the location of charcoal-furnaces and saw-mills, and the time is not very far distant when the common branches of industry of the county will find a lodgment there, and a population of no inconsiderable numbers find constant employment. In a few days we hope to be able to make a trip to the west end of Lake Machigummi and vicinity, when we will take occasion to speak more at length of its undoubted mineral and timber value."

North-Carolina.

THE NORTH BARRIER COMPANY—BULLION, SHIPMENTS, ETC.

WE are informed on good authority that the North Barrier Company, of which Mr. Crosby is Superintendent, is operating in Cabarras County, with very promising results. There are five stamps running, and are crushing from 25 to 30 tons of ore per week, which yields from $8.50 to $16 (coin) per ton; affording them about $100 in gold net profit per week.

The ores that are now being worked are obtained at a depth of about 50 feet from the surface. Richer rock, however, is coming from the 90-feet shaft, which shows that as the miners go down the ore increases in value. Another gratifying feature of this Company's operations, to the stockholders at least, is the fact that Mr. Crosby is making monthly shipments of bullion to headquarters at Washington. We have seen two fine golden bricks weighing 37½ oz. and valued at $1000 currency, which he obtained from 50 tons of surface ore. The prospects of this Company are certainly unusually favorable, and we hope that the measure of their good success will continue to increase. We believe that they have an efficient man in Mr. Crosby, and that if his example of economical working and practical results were followed by others mining in his locality, the bullion yield of the old North State would soon reach to no inconsiderable amount.

Georgia.

THE GOLD MINES.

HIGHTOWN P. O., FORSYTH COUNTY, GA., June 16th, 1869.

A CORRESPONDENT writes from Hightown P. O., Forsyth County, June 16th: "Mining affairs in Georgia at present, although very quiet, wear, in some respects, a cheerful aspect. In Dahlonega one small three-stamp mill is doing finely—clearing, it is reported, $100 per week. A company in my neighborhood is developing a mine that promises well with good-looking rock. The mine, under the superintendence of Dr. Charles, is opening up favorably. The shaft is down one hundred feet, and a new vein, yielding ores worth $80 per ton, free gold and sulphurets, is said to have been struck. The Doctor intends going down fifty feet deeper before he puts up his machinery for taking out the gold."

Arkansas.

REPORTED DISCOVERY OF SILVER.

THE following big story is going the rounds of the press. It reminds us of the youngster's story of the thousand cats in his father's back-yard:

"Silver ore has been discovered in Northwest Arkansas, thirteen miles from Fayetteville. The deposit is silver and copper mixed, between strata of slate, and an experienced miner states that it is equal in richness and extent to the silver mines of Nevada. Some of the metal extracted from the rocks has been pronounced to be nearly pure silver. The ore is said to be very abundant."

Nova Scotia.

THE COAL PRODUCT.

WE give the following statements of the coal raised and sold in the province during the years ending September 30th, 1866, 1867, and 1868:

	1866.	1867.	1868.
Cumberland County,.....	16,449	9,819	10,470
Picton County,.....	205,730	132,609	125,034
Cape Breton,.....	379,124	349,649	276,754
Total tons,.....	601,303	492,077	412,258

—*Eastern Chronicle.*

British Columbia.

THE CARIBOO MINES.

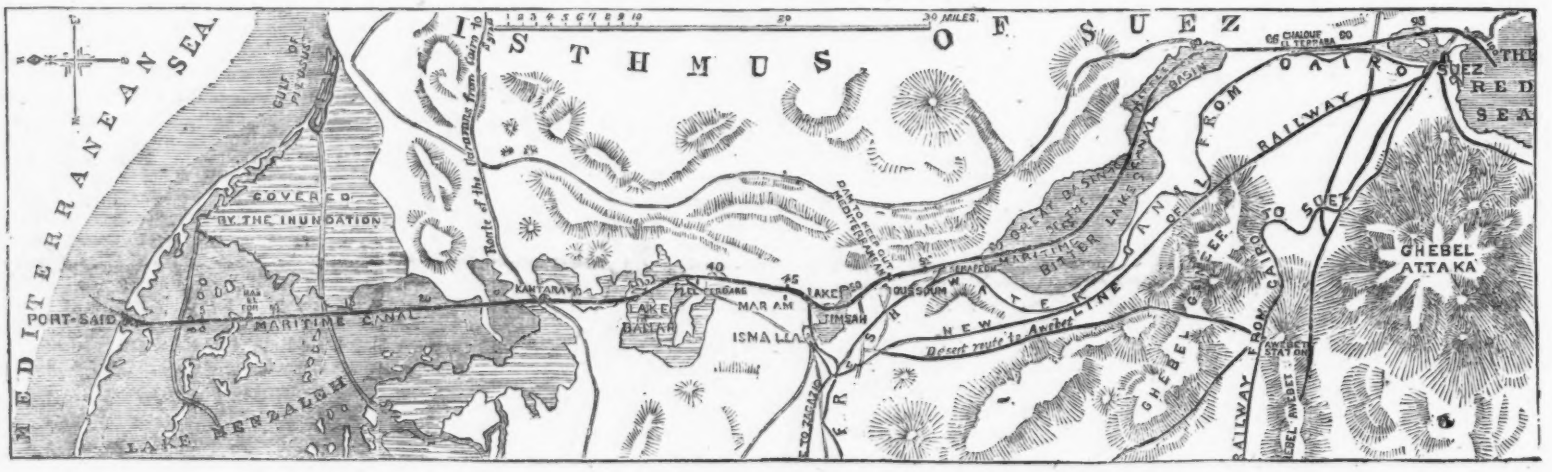
WE have dates from Victoria to June 7th. The papers say that the prospects of the few miners at Looyoos Lake and Rock Creek are good. The Indians at Bentinck Arm are very saucy, and have committed some depredations. The mines at Cariboo have once more assumed the air of activity that characterizes them at this season of the year. The quartz fever has again made its appearance, several ledges having been found which show good indications.

The Suez Canal an Engineering Triumph.

THE month of November will inaugurate the formal opening of the ship canal connecting the European and Asiatic continents through the Isthmus of Suez, a topographical sketch of which accompanies this article. This achievement will be a triumph for France, superior to any political one of the present imperial reign; the engineer will by it show a path to peace and industry superior to any number of treaties and congressional alliances. The canal, when opened, will not be ready for commercial traffic, but a few months will accomplish this; and if the anticipations of success are verified, the company will probably at once commence widening the channel—an operation that can be performed with efficacy and expedition simultaneously with the traffic passing through. Notwithstanding all that has been written upon this subject, both by our home and foreign contemporaries, we think now that it has been revived, a resumé of some of the points of principal interest, and also as to the preservation of the works now on point of completion, will not be unworthy of our readers' attention.

In the words of Mr. John Fowler, the English engineer: "The works of the Suez Canal are simple in character, and in a soil favorable to execution; but they are of such vast magnitude, and in a country which presents such peculiar difficulties in climate and in the absence of fresh water, that special organization and adaptation of means of no ordinary kind have been required for their realization."

The first subject for observation is the harbor of Port Saïd, the European embouchure of the canal; this is formed by the extension seaward of two breakwaters, which protect the harbor securely from the strong and destructive northwest winds. These sea-walls are constructed of concrete blocks, composed of two parts of sand to one of hydraulic lime from France. The depth of the harbor is hardly sufficient for the heaviest war-ships, but for the deepest draught merchant vessels, it will afford shelter to a water area of 500 acres. The greatest care will have to be taken for the prevention of the silting up of the port. Large quantities of fine alluvium are constantly being transported to Port Saïd from the Nile, and the effect of placing a new obstruction to its course by a breakwater, extending at right angles from the shore, must cause a constant tendency to deposit: this result has already occurred to an alarming extent. But serious apprehension need not be entertained of the silting up of the harbor, if dredging be constantly resorted to: this will be a great but necessary source of expenditure.



THE SUEZ CANAL.

The canal is 99 miles in length, in sections as follows:

	Miles.
Port Saïd through Lakes Menzaleh and Balla to near El Ferdam,	37
From near El Ferdam through the great excavation of Seuil d'el Guise to Lake Timsah,	9½
Through Lake Timsah,	5½
From Lake Timsah, through the excavation of Seuil du Serapeum to the Bitter Lakes,	7½
Through the Bitter Lakes,	23½
Through the deep portion of Chalouf cutting,	5
Thence to Suez and the end of the canal,	11
Total length,	99

The two transverse sections adopted with few exceptions throughout the length of the canal are as follows: 196 feet wide at water-level; 72 feet wide at the bottom, with a depth of 26 feet. The slopes are 3 horizontal to 1 vertical, with one or more horizontal benches of 10 feet in width, according to the depth of cutting. The other section is a water surface width of 237 feet, with a uniform depth of 26 feet, and width at bottom of 72 feet. The lower portions of the excavation are 2 horizontal to 1 vertical, but the slopes above and below the surface of the water are 5 to 1, and a horizontal bench of 58 feet connects the two slopes.

The first mentioned transverse section is adopted in the following divisions of the channel:

From near El Ferdam to Lake Timsah.
From Lake Timsah to the Bitter Lakes.
Through the deep part of Chalouf cutting.

The second section being adopted in the following lengths:

Port Saïd to near El Ferdam.
Through Lake Timsah.
Through the Bitter Lakes.
At the Suez terminal of the canal.

We remark that, generally, in that portion of the canal adopting the first section, no stone pitching or provision has been made to protect the banks from the effect of passing winds, or ships, or currents. At Suez, the Red Sea terminal, there is an entrance channel, and basin 980 feet wide at water surface.

The important question that is suggested, on the announcement of the completion of these great works, is, the possibility of maintaining the canal for traffic for a permanency: this has caused grave doubts and apprehensions. Firstly, every attention being shown to the entrance of the channel at Port Saïd, as above referred to, we have to consider the causes of danger to the channel itself. The fear of the desert sands (when carried by storms) of choking up the canal, have, after much observation, proved to be of much less danger than anticipated; indeed, the only portions of the channel likely to be seriously affected by this cause are the two cuttings on either sides of Lake Timsah; and here experiments are being actively carried out in planting shrubs and trees on and contiguously to the slopes. Fresh water at hand at these spots may be utilized in the formation of an oasis round these portions. With all the above precautions, powerful dredgers may have to be called constantly into assistance. Another cause of destruction is the spoliation of the banks by the wash of the passing steamers, also from currents and winds. Pitching will be the corrective for this, and this operation can be carried forward while the canal is in working—the transportation of material being rendered cheaper thereby, although the submerged work will not be so well finished. A great source of trouble now presents itself—namely, the enormous loss of water by evaporation in the Bitter Lake sections. This section of the canal is carried through the Bitter Lake, an area of 100,000 acres of water. The daily calculated loss from this cause will be 250,000,000 cubic feet of water, and this will be principally supplied from the Red Sea, whose tidal range (of about 6 feet at spring and 2 feet at neap-tides) considerably exceeds the tidal range of the Mediterranean. The currents created by evaporation and tide may be productive of much inconvenience.

According to prospective regulations, all steamships (excepting paddle-wheels) may use their own power, and that vessels may be towed through by steam-tugs at a limited range of speed. A strong side wind might cause much difficulty in keeping the ships mid channel (from the banks). But in Egypt strong winds from east and west are not common, and tug-vessels can prove useful in keeping a heavy ship in course.

The Bermuda Dock.

PREPARATIONS for the departure of the Bermuda dock from Sheerness were commenced on Tuesday last, by pumping out six thousand tons of water, which had been admitted into the lower chambers for working purposes, getting the chain-cables ready for slipping, and lashing the powerful steam-tugs detailed to tow the dock from Stangate Creek down Sheerness Harbor to the Nore. The *Locust* and *Bustler* were lashed on the port side, the *Monkey* and *Adder* on the starboard side, the *Scotia* and *Angeria* towing ahead. The *Sheerness* steamed some distance in advance, piloting and clearing the way. In company were the *Buzzard*, *Medusa*, *Wildfire*, and *Terrible*. Every thing being thus in readiness, and the utmost precaution having been taken to insure the safe passage of the dock through the comparatively shallow waters of the upper harbor, the cables of the dock were slipped at twenty minutes past four o'clock on Wednesday morning, and, in the calmest of calm weather, the dock thus made the first movement on her passage out. The progress was of necessity slow, but by half-past five o'clock the dock and the convoy had rounded Garrison-Point Fort, a distance of nearly four miles from the creek where she had been moored. On arriving at the Nore, the *Agincourt* and *Northumberland*, iron-clads, were found to be in waiting, with their steam up, ready to commence the task of towing the dock to Madeira. The dock was taken under the stern of the *Northumberland*, and at once made fast to one of the immense hempen hawsers constructed especially for the purpose, and measuring nearly thirty inches in circumference. The tugs were then cast off, and a second hawser was passed from the *Northumberland* to the stern of the *Agincourt* and secured, the *Terrible* at the same time taking up her position at the stern of the dock, to assist in steering. To afford some idea of the magnitude of the undertaking, as regards towing and steering the immense structure, it may be mentioned that the total length of the "procession," in the order above described, was upward of thirty-four hundred feet. Captain May, of the *Northumberland*, the senior officer of the squadron, assumed the command, and will direct the entire progress of the voyage to Madeira. Navigating-Lieutenant George Brockman, the Queen's pilot, navigated the squadron to the Downs, the dock itself being under the management of Mr. Barnaby, the Admiralty overseer, who has with him a crew of seventy sailors. On arriving at Maderia, the *Warrior* and *Black Prince* will take the places of the *Northumberland* and *Agincourt*. The voyage will then be resumed direct for Bermuda, and off the port of destination, the *Barracouta* and other vessels have been directed to relieve the iron-clads, and navigate the dock to her final moorings. The greatest commendation is due to Captain the Hon. A. A. Cochrane, C.B., for his assistance in preparing the dock for sea, nothing having been omitted that appeared likely to contribute in any way to the safety of the huge structure during so difficult a voyage.—*Engineering.*

From Silver Peak.

THE Austin *Reveille*, June 19th, says:—We are indebted to B. B. Stansbury, who has just returned from a flying trip to Silver Peak, for some interesting information in regard to the doings of the Great Salt Basin Company. On a former visit to that place, Mr. Stansbury, who has interests there, found the mill of the company undergoing a radical change in its batteries. The mill is now in perfect order, and runs to a charm. It has thirty stamps, and crushes and amalgamates forty-five tons of ore daily. This is furnished by the famous Red Mountain Mine, mention of which has frequently been made in this paper. The amount of gold-ore which this mine is capable of yielding appears to be without limit—not less than fifteen thousand tons now lying at the mine. The ore is brought from the mine to the mill, a distance of seven miles, in two huge wagons, each drawn by twelve mules over a railway track laid for the purpose. These mammoth wagons carry twenty-two and a half tons of ore each at a load. The forward spindles are three and a half inches in diameter, and the hind ones four inches, the box being eighteen feet long. The arrangements for loading and dumping are so complete that hardly any handling is necessary. One hundred men are employed by the company. Of this number, forty are Chinese and sixty whites. The wages of the latter are $70 per month and board; the Chinamen get $1 per day and board. The work in the mill and mine is all done by white men, the Chinese being employed on roads, handling wood, cooking, etc. Quite a settlement has sprung up around the mill, and all the conveniences of civilized life—stores, shops, boarding-houses, and ye tiger—being obtainable. Mr. Martin and Major Raymond are there, and appear to be in high spirits. Mr. Stansbury could not ascertain the exact yield of the ore, as he did not wish to be too inquisitive; but, from the best data he could gather, he thinks the bullion shipments of the company reach in the neighborhood of $200,000 per month. But little work beyond that necessary to hold the mines is done by claim-holders outside of the company. The impossibility of getting any ore worked accounts for this. A custom-mill, Mr. Stansbury thinks, would do well there.

Some forty miles south from Silver Peak is another district, called the Gold Mountain District. One of the ledges there, called the Gold Mountain Lode, has been sold to an Eastern company for $30,000, and a twenty-stamp mill was being erected to work its ores.

Colonel Catherwood, who has been operating in the Palmetto District, was said to have sold out and gone east.

Economic Work in Colorado.

THE Central City *Register* says of the new mill of the Sensenderfer Company:

"The Company's mill has been rebuilt, and is now one of the best in Colorado. The old one was constantly getting out of order, requiring every month some new repairs. At last they determined to rebuild it, and have done so. It has twenty stamps, which are put up as solidly as it is possible to do with iron and wood. Over a ton of heavy iron bolts were employed, and now it runs with scarcely any jarring whatever. Each stamp drops from thirty to sixty times per minute, owing to the head of water used and the kind of ore being crushed. There is in connection with it six Bertola pans of the large size, which are used to reduce blanket tailings. They have in six months taken from these tailings, $10,000. The mill has an engine, but it is run by water-power, and not more than a twentieth of the water is used. By this means, engineers, fuel, and the wear of machinery is saved, amounting to at least $20 per day. We have never seen a mill which runs smoother or looked as if it were doing better work. It is now at work on ores from the Bobtail and Colorado State lodes, the latter being located just at the bridge at the Kip mill. The saving made by using water-power must be evident to every one. Were the Black Hawk mill run in this way it would save at least $50 per week to the company, and yet they permit the water to flow past them without using it."

Equivalent Horse-Powers.

IN the United States, as in England, we have 33,000 units per minute, the unit being the foot-pound. This corresponds with 550 units per second. In France, it is 75 units per second, the unit being the kilogrammeter (one hekogram one meter high). In Prussia, by reason of recent experiments, a unit has been adopted of 480 units per second for Prussian feet and pounds, or 28,800 per minute. In Austria, it has been settled that, in the future, 430 foot-pounds must be accepted as a horse-power. Besides this, Prussia has adopted a railroad standard—namely, a load of 250 centners, German weight, moved on a horizontal track with a velocity of one mile per hour, or 65 centners four miles per hour.

USUALLY it is previous rubbing on the inside, by cleaning or otherwise, which breaks the glass tubes of water-gauges. The glass in strong, heavy tubes is in a state of great tension, and the least scratch on the inner surface soon causes a crack, and consequent rupture. Clean them with acids or alkalies, but never by friction, even not of comparatively soft substances.

THE White Pine *News* publishes a table, from which it appears that there are ten mills in that locality, having from five to twenty-four stamps each, or one hundred and twenty stamps altogether. These are all kept constantly at work on good ore. The shipments of bullion have latterly been from $70,000 to $78,000 per week.

THE ENGINEERING AND MINING JOURNAL.

CONTENTS FOR THIS WEEK.

[*Illustrated Articles are marked with an asterisk.*]

*Transmission of Motive Power by Means of Wire Rope,	17	*The Suez Canal an Engineering Triumph,	24
The Roads of New-York Central Park,	18	The Bermuda Dock,	24
The East River Bridge,	19	From Silver Peak,	24
Wood Preservation,	20	Economic Work in Colorado,	24
Desilverization of Lead by Means of Zinc,	20	Equivalent Horse-Powers,	24
Commissioner Wilson on Mineral and Agricultural Lands,	21	EDITORIALS:	
The Mines of Colorado,	21	How to Judge of the Performance of Steam-Engines,	25
QUERIES,	21	Proposed Memorial to Faraday,	25
MINING SUMMARY,	22	Missouri Tin Mines,	25
		A Heavy Blast,	25
		MARKET REVIEW,	26
		Advertisements,	27

PUBLISHERS' ANNOUNCEMENT.

THE ENGINEERING AND MINING JOURNAL *is projected in the intent of furthering the best interests of the Engineering and Mining public, by giving wide circulation to original special contributions from the pens of the ablest men in the professions. The careful illustration of new machinery and engineering structures, together with a summary of mining news and market reports, will form a prominent feature of the publication.*

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NEWS-DEALERS *will be supplied through the agency of the* AMERICAN NEWS COMPANY, 121 *Nassau Street, New-York City.*

COMMUNICATIONS *of all kinds should be addressed to the Publishers. The safest method of transmitting moneys is by checks, or Post-office orders, made payable to their order.*

Correspondence and general communications of a character suited to the objects of THE ENGINEERING AND MINING JOURNAL *will always be welcome.*

The postage on THE ENGINEERING AND MINING JOURNAL *is twelve cents a year, payable quarterly, in advance, at the office where received.*

JOHN F. RICH *is our Agent for New-England. Office,* 13 *Boylston Place, Boston.*

GEO. E. CUMMINGS *is our Agent at Philadelphia. Office,* 154 *South Fourth Street, Room* 5.

WESTERN & COMPANY,
Publishers and Proprietors,
37 PARK ROW,
P. O. Box 5969. New-York City.

How to Judge of the Performance of Steam-Engines.

THE steam-engine being only one of the many possible contrivances to convert heat into motion, its value must be judged like the value of all other objects of practical use and economy. The economy in a steam-engine may be of three different kinds—first cost, consumption of fuel, and labor of attending to it. It is evident, however, that the greater or lesser first cost (being only one single outlay) is such a trifle as compared with the two other kinds of expenses, which are of daily continuance, that it is scarcely ever taken into consideration; also that the labor of attending to an engine has long ago been brought almost to a minimum, and that not much economy is to be expected from improvements in this direction; the great reform left for investigation and experiment is in the matter of consumption of fuel; and the basis on which we judge of the performance of a steam-engine is, how much coal does it consume for every horse-power produced?

In answering this question in a practical manner, the fact is often overlooked that this performance depends on three mutually independent data—firstly, on the engine itself; secondly, on the kind of boiler and furnace employed in generating the steam; and thirdly, on the skill exercised by firemen in heating the boiler; to which may be added a few other points of minor importance, but of decided influence—namely, the quality of the fuel and the precautions adopted to prevent loss of heat by radiation. By this it is evident that the same engine, steadily performing the same amount of work, will, with different boilers, different coal, or even different firemen, give widely varied results in regard to the amount of coal consumed per horse-power, without the engine itself being modified in any way. Consequently, an inferior engine supplied with steam by means of an economical boiler, worked by a skilful fireman, may show as good results in regard to the amount of fuel consumed, as a very superior engine, supplied from inferior boilers, or worked by less skilful firemen. And even if the boilers are of the same kind, experience has proved that every boiler possesses peculiarities in regard to the consumption of fuel per pound of water evaporated, which will cause, that the supply of steam needed by one machine will approach more nearly to the rate of the most economical evaporation than that required by the other. These differences will depend sometimes on apparently trifling peculiarities in the draught of the flues, position and location of boilers, etc.; all this may cause inequalities, of which it is impossible to estimate correctly the amount. It is evident, therefore, that in order to judge of the value of an engine we must not consider engine and boiler as a whole, but as two entirely independent parts, either of which may be good or bad, and must be tested separately.

We must remind the reader that, in order to estimate the horse-power of an engine, it is by no means correct to take the pressure of the steam in the boiler in pounds per square inch, and then to multiply this by the surface of the piston, also in square inches, also to multiply this by the distance in feet that the piston has travelled in a minute, and finally to divide this number of foot-pounds by 33,000, in order to reduce it to horse-power. This rule is, to the astonishment of all engineers, in this year 1869, still repeatedly stated in a certain scientific contemporary, notwithstanding that since a period verging on fifty years, it has been proved by De Pambour, in France, and MacNaught, in Scotland, that we must not consider the pressure in the boiler as the basis of our calculation, but the pressure of the steam in the cylinder while the piston is in motion. De Pambour demonstrated that the pressure of the steam on the moving piston is often only a fourth part of that in the boiler, caused partially by loss during the passage of the steam through the connecting tubes often possessing a number of bends, partially by loss of heat in the cylinder, which never can be as hot as the boiler, but principally by the fact that the steam has to follow the receding piston, and therefore cannot possibly exert upon it its full pressure. De Pambour proved that the cause of the disagreement in the old style of calculation and the practical result was due to these causes, and not to friction, as supposed at his time, that it would be absurd to suppose that in a well-made engine the loss of power by friction and other imperfections could be as much as three fourths of the power employed, and that when substituting in the above calculation the pressure in cylinder for the pressure in boiler, the theoretical results agreed with practice.

The pressure in the cylinder of a steam-engine while in motion is obtained by means of the indicator, to the description and use of which we will have to devote a special article in a future number. We will here only speak on the subject of testing the economy of an engine in regard to the amount of steam used per horse-power—the latter obtained by the indicator or other suitable and reliable means. In this manner we eliminate the influence of the boiler, as we do not take in account the amount of fuel consumed to produce that steam.

The weight of the steam consumed may be estimated from the quantity of water evaporated in the boiler; but as all boilers prime to a certain extent, the amount of which cannot be determined, but has always the effect of causing an apparent greater amount of evaporation than actually is the case. Notwithstanding, it was hitherto far the best test we possessed to judge of an engine independently of the kind of boiler employed, and in the U. S. Navy Yard, at Brooklyn, experiments have been in progress for many years, determining correctly the quantity of water used for the steam-engines in operation there. The conditions to be followed in such determinations are: 1st. The water to be measured in tanks, and not by water-meters, which are always unreliable. 2d. No steam to be used from the boiler, during the trial, for other purposes than for the engine to be tested. 3d. To let the engine perform a constant well-determined amount of labor during the trial (the pumping out of the large U. S. Dry Dock in Brooklyn, containing a well-known amount of water, lifted to a certain height in a certain time, was one of the best kinds of test which could be devised). 4th. The amount of water in the boilers at the end of the experiment should be exactly the same as in the beginning. 5th. When the boilers have blown off salt or muddy water, during the trial, this amount should be ascertained. 6th. The experiments should be very carefully and skilfully performed, and often repeated, in order to eliminate incidental inaccuracies, caused by temperature of the air, variation of water-level, etc.

There is, however, another and better method more scientific at the same time, to which the objections which may be made to the above do not apply. It is to measure the number of units of heat carried off from the engine by the exhaust steam; this heat is, in the case of the condensing engine, imparted to the water used for this condensation. Many years ago some practical engineers of superior intelligence invented this simple method, and carried it out in a rude manner by dipping their hands in the hot wells of their engines, and obtained in this way a pretty correct idea of the manner in which their engines were working. This method has been perfected, and by supplying an engine with a constant amount of condensing water, and measuring the variation in its temperature by means of the thermometer, the relative economy of different rates of cut-off, or expansion, etc., when working against constant resistance, has been correctly ascertained.

To understand this method more clearly, we must bear in mind, what was said in the first paragraph of this article, that a steam-engine is a heat engine, and converts a portion of the heat supplied in the form of steam into motion; better the engine is, more heat it will transform in this way, and consequently less will be carried off in the exhaust steam or water of condensation; therefore, if we multiply the number of pounds of condensation water used per minute by the difference of its temperature, before, and after it has condensed the steam, and thus obtain in units the quantity of heat not converted into motion, but carried off and lost, and notice how often this surpasses the horse-power obtained, we have very reliable data for the comparison of different engines, independently of the value of the boilers used.

The method to arrive at this last heat is simple enough; the water from the hot well is conducted through a wooden trough, having partitions, over and under which the water flows, causing steady current where it escapes, and where by the well-known methods its amount running off per minute is calculated; two thermometers are attached, one where the cool water enters the condenser, and one where the warm water escapes in the trough. The difference in temperature is of course the heat carried off.

A fact in favor of this method is that for the same engine it gives, within reasonable limits of pressure, very constant results, and therefore needs not to be extended for a long period of time, like the former method (the measuring of the amount of water used supplied by the boilers); it also gives a simple mode of determining the actual amount of work performed by an engine when once the same has been tested in this way. Let us suppose, for instance, that in an engine of sixty-horse-power 24,000 units of heat were passing off per minute, this would give 400 units lost per horse-power, which number represent the constant loss of that special engine. Suppose now it was found that by supplying more or higher pressure steam, the velocity of the engine was increased, and the heat carried off by the water of condensation was raised to 32,000 units, it will follow that 32,000 divided by 400, or eighty-horse-power, would be developed. This simple method may therefore be useful to estimate the power required to drive various machines, shafting, etc., by increasing the steam, and so to work the engine at the same velocity, with and without the increased work, and dividing the units of heat escaping by the united number obtained from previous experiments. In order to obtain a constant record of the performance of engines employed for large establishments, Messieurs Farey and Donkin in London have even attached a photographic apparatus to the thermometers, by which the shadow of the mercurial column is photographed on a sheet of sensitised paper, which is carried forward by a slowly revolving drum, in exactly the same manner as at present the atmospheric temperature, barometer heighths, compass-needle variations, etc., are recorded, the quantity of water passing out of the tank being also registered in a mechanical manner, like the fall of rain is registered in meteorological observatories.

In order to apply this method to high-pressure engines, the exhaust steam is simply turned into a tank with water and condensed, the thus heated water is continually measured, in regard to temperature and quantity, and the problem is reduced to that of the condensing-engine.

Proposed Memorial to Faraday.

ALL professing a love for science, and respect for a devoted professor of scientific researches, must be gratified to hear that a most influential meeting, presided over by the Prince of Wales, and gathering together illustrious representatives of all branches of science, was held on Monday, June 21st, within the walls of the Royal Institution in London, for the purpose of paying homage to the memory of the illustrious Faraday, whom Sir John Herschel styles the "blameless prophet of British science—so clear and far-reaching was he in his views, so indefatigable in their pursuit, so single in his objects, so blameless in his life, so genuine, candid, and unaggressive in all his relations with his brother savans."

Much interest was attached to the meeting on account of the eloquent remarks of M. Dumas, the eminent French chemist (Master of the French Mint), who had crossed the Channel to express alike with this scientific brotherhood his veneration for the illustrious deceased. The decision of the meeting was the following:

The erection of a public memorial—to be decided on by a joint committee of scientific men—and subscriptions were at once ordered to be opened at the Royal Institution, Albemarle-street, London, in furtherance of the object.

Missouri Tin Mines.

A FEW weeks ago a statement appeared in several papers, that Professor Shepard, of Amherst College, had examined the tin mines near Iron Mountain, and had reported favorably in regard to them. The facts, as stated by himself, are as follows: During his visit to the mines the managers showed him fine specimens of tin said to have been taken from their ore. They put several specimens of ore through the separating process, and exhibited a large quantity of tin as the result. He accordingly telegraphed to parties interested "Every thing appears to be as represented." And this telegram was the foundation of the newspaper notices referred to. Before making a regular report, however, he took specimens of ore, selected by himself, to his own laboratory; and he found that the percentage of tin was very small, altogether too small to pay for working. His final report was to that effect. He thinks the mines worthless, and says much money has been unwisely spent there. He is unwilling to allege that the managers have been dishonest; but a man less mindful of other people's feelings might see cause for suspicion in the remarkable discrepancy between the results of the assay made at the mines and that obtained by Professor Shepard.

A Heavy Blast.

A GREAT blast was lately made at the lime-quarries in Clitheroe, England. A tunnel twenty-eight yards in length was bored, and sixty hundred-weight of powder walled in it. The mass of stone sixty feet in height was thrown upward in a very nearly vertical direction, and at least 50,000 tons of solid limestone was displaced.

IN order to give pale brass a fine, gold-yellow color, it should be carefully polished, and then plunged for a few minutes into a moderately heated, dilute solution of pure crystallized verdigris, or, in other words, neutral acetate of copper. It is of importance that no free acid be present in the solution.

THE inauguration ceremony of the opening of the Suez Canal has been postponed until November 17th, 1869.

MARKET REVIEW.

The Coal Trade.

NEW-YORK, July 8th, 1869.

THE market has become quiet and settled, now that we are producing our usual full supply of coal, excepting only some 40,000 tons from the mines of the two companies whose men have not yet resumed work. There is no great rush of out-of-town dealers for a supply, and the demand for city trade may be termed light. Coal has however advanced, both at wholesale and retail; and what were considered fancy prices two or three weeks ago are now accepted as regular by the trade—namely: Lehigh, from $6.75 @ $7.75, along side; Schuylkill, $7 @ $7.50, on board. The Reading Railroad has taken off the drawbacks on all coal shipped east of New-Brunswick, and the canal has advanced toll. This is one reason for the advance in prices. Another is, that as the season advances the time during which coal can be transported by canal is shortened. All demands cannot be supplied at once, and thus the demand becomes greater than the supply; hence an advance in prices ensues. It was at this time last year that the strike on the "eight-hour law" took place throughout the region. This strike lasted seven weeks, and during that period our statistics show that some 1,444,000 tons of coal reached tide-water. Estimating the capacity of production for the next seven weeks (leaving out the two companies on a strike now), it may safely be stated that the supply will reach 300,000 tons per week, or a total for seven weeks of 2,100,000 tons. Therefore, for seven weeks from July 3d, 1869, we shall have 656,000 tons more on hand than in 1868, less the present decrease on account of the strike just ended of 565,077 tons, which will leave about 100,000 tons increase this year over last on August 22d. Now, to all who know that the annual increase of the consumption of coal is about ten per cent per annum, it will be apparent that we shall be in actual deficit all of 500,000 tons on August 22d next. Truly, with these figures staring us in the face, the prospects for cheap coal this winter are not very favorable. We advised dealers two weeks ago to come to market and buy their coal when it was $1 per ton cheaper than it is now. We urge them to give their orders *now*, and yet save $1 per ton. The fact is, every body will in a short time want to be supplied at once, and, as it is impossible to do this, prices during the excitement will range higher. Don't forget the lesson learned in 1868.

From "those who know" of the intentions of the Scranton and Lackawanna Companies, whose men are yet out, we learn that the companies do not intend to give way one inch. It is difficult for us to see what advantage is to be gained by these companies in refusing to do as their neighbors have done. The new basis is evidently right in principle, and any errors in it, if there be any, will eventually be corrected. The miners feel the strength of their organization now, and, if cool deliberation continues to govern their councils, they will perhaps be able to do what the operators have failed to do—namely, establish some fixed basis of operations and remuneration. For our part, we feel called upon to advocate any method that will deprive the trade of these periodical convulsions, and which will take from it its present speculative character. To-day, there is scarcely a dealer that thoroughly understands the situation of affairs, and we don't wonder at it, for it takes the keenness of a Wall-street gambler to keep pace with the continual changes in every department of the coal-trade. The miners are about to strike; tolls are to be raised or lowered; a large auction sale is threatened; prices by a leading company are announced and withdrawn the same day; a break in the canal is reported; a smash-up on the railway is announced—and thus it is, every week brings some new dodge to mystify and perplex. This has been the course of management of the Operators' Association. Let us see what state of affairs will be produced by the Miners' or Workingman's Association. The retail price for coal in this market has advanced to $8 and $8.50 per ton, with a fair trade doing. Freights remain unchanged as yet. Trade is not active enough to take up all the vessels offered. Our price-lists are about complete this week, and can be relied upon.

We take pleasure in calling the attention of the trade to the card of Messrs. LEWIS AUDENRIED & Co., which again makes its appearance in our advertising columns. Their Diamond Vein and Locust Dale White-Ash coals are unsurpassed, and, in order to get supplies of them, orders must be sent in early.

The following table exhibits the quantity of Coal passing over the following routes of transportation for the week ending July 2d, 1869:

COMPANIES.	1868. WEEK.	1868. TOTAL.	1869. WEEK.	1869. TOTAL.
Phila. & Read. R. R.	70,562	1,626,804	97,797	1,446,143
Schuylkill Canal,	33,921	453,676	37,923	232,593
Lehigh Valley R. R.	42,418	1,347,972	38,386	1,137,314
Lehigh & Sus. R. R.	7,113	187,546	15,952	362,746
Lehigh Canal,	35,298	353,188	6,971	185,675
Scranton North,	12,812	240,765		205,857
" South,	17,937	546,198		587,630
Penn. Coal Co., rail,	22,181	422,819	24,179	473,711
" " " canal,	1,304	10,979	477	7,128
Del. & Hudson Rail,			127	98,431
" " " canal,	40,259	580,884	22,109	530,018
Shamokin,	12,231	234,381	9,209	158,586
Trevorton,	395	9,008	329	7,493
Short Mountain,		47,134		46,552
Lykens Val. Can. Co.	1,995	39,196	2,113	27,627
Hunt'g'n & B'd Top,		109,112		164,889
Wyoming South,	2,102	79,102	9,071	57,631
" North,				
Williamstown, Col'y		82,625		72,658
Total,	300,528	6,371,389	264,643	5,802,682
1869,		5,802,682		
Decrease,		568,707		

Lehigh Canal Coal Trade.

Shipped for the Week Ending July 3, 1869.

WHERE FROM.	WEEK. Tons. Cwt	TOTAL. Tons. Cwt
Total M. Chunk Region,		51,453 17
" B. Meadow "	1,540 14	26,462 09
" Mahanoy "	96 12	974 13
" Hazleton "	132 01	50,396 03
" Upper Lehigh "		2,181 14
" Wyoming "	5,201 06	54,206 08
Grand Total,	6,970 13	185,675 04
Corresponding week last year,	35,298 03	353,187 19
Increase,		
Decrease,	28,327 10	167,512 15

Report of Coal Transported over Lehigh Valley Railroad

For the week ending July 3, 1869, and previously this season, compared with the same time last year:

WHERE SHIPPED FROM.	WEEK. Tons. Cwt	PREVIOUSLY Tons. Cwt.	TOTAL. Tons. Cwt.
Total Mahanoy,	13,454 00	142,881 18	156,335 18
" B. Meadow,	6,922 04	172,379 19	179,302 03
" M. Chunk,		124 04	124 04
" U. Lehigh,		7,506 16	7,506 16
" Hazelton,	7,115 10	498,213 01	505,328 11
" Wyoming,	9,544 01	190,690 07	200,234 08
Total,	37,035 15	1,011,796 05	1,048,832 00
To L. & S. R. R., at P'n Hav. for rail,		4,174 00	4,174 00
Do. for canal,	132 01	54,281 12	54,413 13
At Mauch Chunk for Canal,	1,637 06	27,705 03	29,342 09
Total Anthracite,	38,805 02	1,097,957 00	1,136,762 02
Susquehanna Region Bit. Coal (Fall Creek),		552 03	552 03
Tl. by rail & canal,	38,805 02	1,098,509 03	1,137,314 05
Same time last y'r,	53,744 12	1,294,227 15	1,347,972 07
Increase,			
Decrease,	14,939 10	195,718 12	210,658 02
Forw'd east from M. C'k by rail,	36,386 13	977,394 03	1,013,780 16
Same time last y'r,	42,417 13	1,223,149 03	1,265,566 16
Increase,			
Decrease,	6,031 00	245,755 00	251,786 00

RECAPITULATION:

Forw'd east from M. C'k by rail,	36,386 13	977,394 03	1,013,780 16
Del. at M. Chunk,	10 15	599 14	610 09
Del. on line of r'd above M. Chunk,	66 05	5,123 05	5,189 10
Del. ab. M. C. for use of L.V.R.R.,	513 10	24,197 18	24,711 08
To N. C. R. R., at Mt. Carmel,		2,516 09	2,516 09
To L. & S. R. R., at P'n Hav., for r'l,		4,174 00	4,174 00
Do. for canal,	132 01	54,281 12	54,413 13
Do. Packerton for rail,	58 12	2,516 19	2,575 11
At Mauch Chunk for canal,	1,637 06	27,705 03	29,342 09
Total,	38,805 02	1,098,509 03	1,137,314 05

Lehigh and Susquehanna Railroad.

Report of Coal Shipped for the Week ending July 3, 1869.

WHERE FROM.	WEEK. Tons. Cwt	TOTAL. Tons. Cwt.
Total M. Chunk Region,	22 11	67,625 04
" Hazelton "	132 01	51,946 00
" Upper Lehigh "	500 16	57,078 15
" Wyoming "	20,630 14	290,624 12
Grand Total,	21,286 02	467,274 11
Corresponding week last year,	23,349 01	358,296 11
Increase,		108,978 00
Decrease,	2,062 19	
Forwarded South from Mauch Chunk,	15,001 00	327,938 12
Delivered on line of L. & S. R. R., above Mauch Chunk,	900 15	15,967 10
Delivered to Lack. & Bloom. R. R., at Plymouth Bridge,		13,688 06
Delivered to L. V. R. R. Co., at Sugar Notch,	51 00	5,151 03
Delivered at Coal Port, for Shipment by Canal,	5,333 07	104,529 00
To North Branch Canal,		615 16
Total,	21,286 02	467,274 11

Schuylkill Coal Trade.

By railroad and canal for the week ending Thursday, July 1st, 1869.

PLACES.	RAILROAD.	CANAL.
St. Clair,	38,944 19	
Port Carbon,	8,757 11	14,091 00
Pottsville,	5,264 09	2,426 00
Schuylkill Haven,	25,714 01	19,226 00
Auburn,		
Port Clinton,	16,500 07	1,280 00
Total paying freight,	95,181 07	
Coal for Company's use,	2,616 02	
Total for week,	97,797 09	37,923 00
Previously this year,	1,348,345 18	195,570 15
Total,	1,446,143 07	232,593 15
To same time last year,	1,626,803 16	453,675 19
Increase,		
Decrease,	180,659 09	221,082 04

Prices of Coal by the Cargo.

[CORRECTED WEEKLY.]

	AT NEW-YORK, July 8th. R. A.	W. A.	AT PHILADELPHIA, July 8th. R. A.	W. A.
SCHUYLKILL.				
Lump,	$	$7 50	6 75	7 00
Steamer,	....	7 75	"	"
Broken,	....	7 75	"	"
Egg,	....	7 75	"	"
Stove,	....	8 00	"	"
Chestnut,	....	7 00	5 75	6 00
Pea,	....	....	....	....
LEHIGH.				
Lump,	....	....	7 00	....
Steamer,	....	....	7 00	....
Broken,	....	....	7 00	....
Egg,	....	....	7 00	....
Stove,	....	....	7 25	....
Chestnut,	....	....	6 50	....
Pea,	....	....	4 75	....
SPECIAL COALS.*				
Diamond Vein,	R. A.	8 25	....	....
New-England,	"	....	....	....
Locust Dale,	W. A.	8 00	....	....
Honey Brook, Le'h	"	7 50	....	....
Harleigh,	"	7 50	....	....
Spring Mount'n	"	7 50	....	....
Sugar Creek,	"	7 50	....	....
Sugar Loaf,	"	7 50	....	....
Fulton,	"	7 50	....	....
Stout,	"	7 50	....	....
Old Comp'y's	"	"	....	....
Cross Creek,	"	7 50	....	....
Chauncey,	"	"	....	....
Girardville,	"	"	....	....
McMichael,	"	"	....	....
Duncan,	"	"	7 00	7 50
Shamokin,	"	7 00	....	7 25
Lykens Valley,	"	7 25	....	7 25
Broad Top,	"	"	....	5 50
Hill & Harris,	"	7 00	....	6 75
Henry Clay,	"	7 00	....	7 00
Powelton,	"	"	....	7 25
Burnside,	" R. A.	....	....	7 50

[* Dealers in these coals may be found in our advertising columns.]

Prices of Coal by the Cargo.—Continued.

COMPANY COALS.	L. Str.	Gra.	Eg.	Sto.	Cst.
Scranton at E. Port,	.. ..	..	..	..	..
Pittston at Newb'g,	.. ..	..	..	..	..
Lacka'na at Rond't,	7 25	7 25	7 25	7 50	6 10
Wilk'b're at Hob'kn,	.. 7 25	7 25	7 25	7 50	7 00

For freights to different points, see "Freights."

Prices at Baltimore, June, 1869.

Wholesale Prices to Trade.

Wilkesbarre, by cargo or car load,	$6 75	7 00
Pittston and Plymouth,	6 50	6 75
Shamokin R., or W. Ash,	6 50	6 75
Lykens Valley, R. A.		7 00
Trevorton, R. A.	6 50	6 75
By retail, per ton of 2240 lbs. delivered,	8 00	8 50
Georges Creek & Cumberland f. o. b. at Locust Point for shipping,		5 00
West Fairmount Gas, f. o. b.,		6 00

Prices at Georgetown, D. C., & Alexandria, Va.

July, 1869.

George's Creek & Cumberland f. o. b. for shipping, $4 75

Prices at Havre de Grace, Md.

July, 1869.

Wilkesb're & other White Ash for cargoes,	$6 75	7 00
Lykens Valley,	7 00	7 25
Shamokin R. or W. Ash,	6 75	7 25
Trevorton and Zerba Valley,	6 50	7 00

Prices for Coal at Mauch Chunk.

	L. Str.	Gra.	Eg.	Sto.	Cst.
Lehigh,	....	....	....	....	....
Wilkesbarre,	$4 00	$4 50	$4 50	$4 50	$4 50	$4 00

Freight to Elizabethport, $2.28; to New-York, $2.35.

Prices of Foreign Coals.

June.

Duty, $1.25 per ton.

Corrected weekly by PARMELEE BROS., 32 Pine-street, New-York.

Liverpool Gas Caking,	$ 9 50	
" " Cannel,	14 00	
" House "	18 00	19 00
" " Orrel,	16 00	18 00

Per ton 2240 lbs., Ex. Ship.

PRICES FROM YARD.

Liverpool House Orrel, screened,	$16 00	$18 00
" " Cannel, "	18 00	20 00

Per ton 2000 lbs., delivered.

Prices of Gas Coals.

June, 1869.

PROVINCIAL.

Duty, $1.25.	Coarse. Gold.	Slack. Gold.
Block House,	$1 75 @ $	75
Gowrie,	1 75	75
Lingan,	1 75	75
Sydney,	2 13½	71½
Picton,	2 13½	1 18½
Little Glace Bay,	1 50	1 00
Caledonia,	1 50	75

AMERICAN.

	Coarse. Currency.	Slack. Currency.
Westmoreland Co.,	$8 75	
Despard Coal Co.,	8 50	8 00
Penn.,		
Newburg Orrel Gas,	8 50	8 00
West Fairmount Gas Coal,		8 00

AT PHILADELPHIA.

Kittaning Coal Co.'s Phœnix Vein, f. o. b.	$ 65	25
Lemon " "		5 00
Powelton,		7 80

Freights.

July, 1869.

To Eastern Ports.	From Philadel'a.	From E. Port and Port Johnston.	From Newburg.	From Rondout.
Stamford,	....	$1 00	$1 25	$1 25
Norwalk,	$2 05	1 00	1 25	....
Bridgeport,	2 00	1 15	1 25	1 25
New-Haven,	2 25	1 00	1 25	1 25
Hartford,	2 25	1 10	....	1 65
New-London,	2 35	1 15	1 35	1 35
Norwich,	2 35	1 25	1 45	1 45
Mystic,	....	....	1 40	....
Stonington,	....	....	1 40	1 35
Sag Harbor,	....	....	1 40	....
Bristol,	2 00	....	1 55	1 60
Newport,	2 00	1 40	1 55	1 60
Fall River,	2 00	1 40	1 55	1 60
Providence,	2 00	1 40	1 60	1 60
Dighton,	2 25	....	1 60	....
Warren,	....	....	1 60	....
Pawtucket,	1 75	....	1 75	1 75
New-Bedford,	2 25	1 40		1 75
Boston,	2 50	1 75	1 75	1 75
East Cambridge,	2 75	....	1 85	....
Salem,	2 50	1 75	1 75	1 75
Newburyport,	....	2 00	1 85	1 80
Portsmouth,	2 75	1 75	1 80	1 80
Rockport,	....	....	1 80	....
Saco,	2 85	1 75	1 80	1 75
Portland,	2 50	1 75	1 75	....
Bangor,	2 50	....	1 75	1 80
Bath,	2 50	....	1 80	....
Middletown,	....	....	....	....
To River Ports.				
Troy,	1 95	95	60	55
Albany,	1 90	90	55	50
Coeyman's,	1 50	....	55	50
Stuyvesant,	1 50	....	50	45
Coxsackie,	1 75	....	45	45
Hudson Railroad,	....	1 00	40	50
Catskill,	....	....	40	35
Poughkeepsie,	1 50	75	30	25
Fishkill,	1 55	....	20	30
Cold Spring,	1 75	70	30	50
Haverstraw,	1 50	50	45	50
Nyack,	1 45	50	55	50
Sing Sing,	1 50	....	60	50
Yonkers,	1 40	40	60	55
New-York,	1 40	50	60	65
Saugerties,	1 50	....	35	30
Rhinebeck,	1 50	....	30	35
Rondout,	1 60	60	30	25
Tarrytown,	1 75	80	....	....
West Point,	1 50	75	30	50

Foreign and Provincial Freights.

July, 1869.

Foreign.	
New-Castle and Ports on Tyne,	£15@£18 keel.
Liverpool,	15s. 17s. ton.
Australian,	9 50@10 00
do. Wallsend,	10 00 10 50
Bellingham Bay,	11 00 ....
California,	7 00 9 00
Cumberland cks.,	30 00 32 00
do. bulk,	28 00 ....
Chili,	10 00 ....
Lehigh,	15 50 16 00
Liverpool,	13 00 ....
Pittston, ton,	14 50 15 00
Scranton,	14 00 15 00
Scotch,	13 00 ....
Vancouver Island,	12 50 ....
TO NEW-YORK.	
Provincial.	
Sydney,	$3 25
Lingan,	3 25
Cow Bay,	3 25
Port Caledonia,	3 25
Little Glace Bay,	3 25

Foreign and Provincial Freights—Continued.

TO BOSTON.	
Sydney,	$2 75
Lingan,	2 75
Cow Bay,	2 75
Port Caledonia,	3 00
Little Glace Bay,	2 75

Rates of Transportation to Tide Water.

[BY RAILROAD.]

TO PORT RICHMOND, PHILADELPHIA.

Philadelphia and Reading Railroad, from Schuylkill Haven, $2 00

From Port Carbon, 8 cents per ton more.

TO ELIZABETHPORT.

L. V. Railroad from Mauch Chunk to Easton,	$ 81
C. R. R., N. J., Easton to Elizabethport,	1 22
	$2 03
Shipping Expenses at Elizabethport,	25
Total,	$2 28

TO PORT JOHNSON.

L. V. R. R.,	$ 81
C. R. R. of N. J.,	1 29
Shipping Expenses,	25
Total,	$2 35

TO HOBOKEN.

L. V. R. R.,	$ 81
Morris & Essex R. R.,	1 29
Shipping Expenses,	25
Total,	$2 35

[BY CANAL.]

TO PHILADELPHIA.

From	Pt. C.	Potts.	S. H.	Pt. C.
Tolls,	$1 43	$1 42	$1 40	$1 04

TO NEW-YORK (Morris).

Lehigh Canal Tolls,	$ 40
Morris Canal Tolls,	45
Freight,	1 55
Towing,	10
Total,	$2 50

TO NEW-YORK (Delaware and Raritan).

Lehigh Canal Tolls,	$ 40
Delaware Division Tolls,	30
Delaware & Raritan Tolls,	35
Freight,	1 25
Towing from New-Brunswick,	20
Total,	$2 50

TO NEW-BRUNSWICK for Re-shipment.

Lehigh Canal Tolls,	$ 40
Delaware Division Tolls,	30
Delaware & Raritan,	35
Freight,	1 05
Shipping,	25
Total,	$2 35
Drawback,	10
	$2 25

Metals.

IRON.—Duty: Bars, 1 to 1¼ cents ℔ lb; Railroad, 70 cents ℔ 100 lbs.; Boiler and Plate, 1¼ cents ℔ lb; Sheet, Band, Hoop, and Scroll, 1¼ to 1½ cents ℔ lb; Pig, $9 ℔ ton; Polished Sheet, 3 cents ℔ lb.

Pig, Scotch, No. 1, ℔ ton,	39 —@44 —
Pig, American, No. 1,	42 — — —
Pig, American, No. 2,	38 — 39 50
Pig, American, Forge,	36 — 37 —
Bar, Refined, English and American,	85 — 90 —
Bar, Swedes, assorted sizes (gold),	82 50 87 50
STORE PRICES.	
Bar, Swedes, ord'y sizes, less 5 ℔ ct.,	— — 140 —
Bar, Refined, less 5 ℔ ct.,	90 — 92 50
Bar, Common, less 5 ℔ ct.,	85 — 87 50
Scroll, less 5 ℔ ct.,	120 — 150 —
Ovals and Half-round, less 5 ℔ ct.,	117 50 142 50
Band, less 5 ℔ ct.,	117 50 — —
Horse Shoe, less 5 ℔ ct.,	117 50 — —
Rods, ¼ to 3-16 inch, less 5 ℔ ct.,	97 50 155 —
Hoop, less 5 ℔ ct.,	125 — 180 —
Nail Rod, less 5 ℔ ct.,	8½ — 9½
Sheet, Russia, as to Nos. (gold),	— 11½ — 13½
Sheet, Single, D. and T. Common,	— 5 — 7
Sheet, Galvanized, List 20 @ 25 ℔ cent dis.	
Rails, English (gold), ℔ ton,	— 55 — 56
Rails, American, at Works in Pa.,	— 75 — 76

STEEL.—Duty: Bars and ingots, valued at 7 cents ℔ lb or under, 2½ cents; over 7 cents and not above 11, 3 cents ℔ lb; over 11 cents, 2½ cents ℔ lb, and 10 ℔ cent ad val. (Store prices.)

English Cast (2d and 1st quality) ℔ lb,	— 18 @ — 22
English Spring (2d and 1st quality),	— 9 @ — 11½
English Blister (2d and 1st quality),	— 11½@ — 19
English Machinery,	— 12½@ — 15
English German (2d and 1st quality),	— 14 @ — 16
American Blister, "Black Diamond,"	— 10½@ — 16
American, Cast, Tool, "	— 19 @ — —
American, Spring, "	— 10 @ — 13
American Machinery, "	— — @ — 13
American German, "	— 10 @ — 13

COPPER.—Duty: Pig, Bar, and Ingot, 5; old Copper cents ℔ lb; Manufactured, 45 per cent ad val.

	All Cash.
Copper, New Sheathing, ℔ lb,	— @ — 32
Copper Bolts,	— @ — 33
Copper Braziers,	33 @ — 35
Copper Nails,	38 @ — 40
Copper, Old Sheathing, etc., clean,	22 @ — 23
Copper, Chili Pig,	— @ — —
Copper, American Ingot,	22 @ — 22½
Yellow Metal, New Sheathing,	— @ — 27
Yellow Metal Bolts,	— @ — 27
Yellow Metal Nails,	— @ — 27

LEAD.—Duty: Pig, $2 ℔ 100 lbs.; old Lead, 1½ cts. ℔ lb; Pipe and Sheet, 2½ cents ℔ lb.

Galena, ℔ 100 lbs,	— — @ — —
Spanish (gold),	$6 30 @ $6 37½
German "	6 30 @ 6 50
English "	6 30 @ 6 87½
Bar, (less 6 ℔ cent)	— — @ 10 50
Pipe and Sheet, "	— — @ — 12

REMARKS.

IRON.—There is no improvement in the demand for either Scotch or American Pig—dealers buy only as their immediate wants compel, and holders prefer to put their goods in yard rather than sell at reduced rates. We quote Scotch, $39 @ $44; and American, $42 for No. 1, and $38 @ $39 for No. 2. The sales are 200 tons Englinton, on private terms; and 150 do. Glendon No. 1, $39.50. English Rails are firmly held at $55 @ $56 gold; and American, $75 @ $76 currency, at the Works in Pennsylvania. Bar is quiet at old rates for lots from jobbers' hands.

The following is a statement of the amount of Pig Iron transported by the Lehigh Valley Railroad Company for the week ending July 3d, 1869: From Carbon Iron Co., 180 tons; from Lehigh Valley Iron Co., 65 tons; from Thomas Iron Co., 530 tons; from Lehigh Crane Iron Co., 1020 tons; from Allentown Iron Co., 720 tons; from Robert Iron Co., 85 tons; from Glendon Iron Co., 435 tons; from Bethlehem Iron Co., 370 tons; other shippers, 320 tons. Total, 3725 tons.

COPPER is firm, but quiet, at 22c. for both Lake Superior and Baltimore. Small lots from dealers' hands have sold at 22¼c. @ 22½c. Sales for the week, 350,000 lbs. Lots for August and September delivery are held at 22¼ cents.

The London market is unchanged at £68 10s. for Chili Bars.

TIN.—Straits is quoted at 29½c. @ 30c. gold; Banca, 33½c., and English, 30c., with a jobbing business only.

The London market declined to 128 for Straits, but recovered to 130.

SPELTER is nominally $6.50, gold, for Silesian, without wholesale transactions.

LEAD can be bought at $6.25, gold, for ordinary foreign from ships. The quotation is $6.30 @ $6.35.

ZINC.—Business is dull. We quote American Dry, 8c. @ 8¼c.; French Dry, 12c. @ 12¼c.; Metallic, 12c. @ 12¼c. Duty, 2¼c. per pound.

Mining Stocks.

NEW-YORK, July 7th, 1869.

THE sales at the Mining Board to-day consisted of Smith and Parmelee, in large lots, at $1.75 @ $1.85, and a few small lots at $1.90. A few shares of Gregory went off b. & s. 3 at $1.60.

No sales transpired to-day in petroleum shares at the Board.

The following table exhibits the prices current for mining stocks in this market as reported by the exchange:

	Bid.	Asked.
Benton Gold	$ —	40
Consolidated Gregory	1 55	1 60
Grass Valley	51	59
Gunnell Gold	—	50
Mariposa	8	9¼
" pfd.	15	17
Montana Gold	—	—
Quartz Hill	86	95
Smith & Parmelee Gold	1 80	2 00
Rocky Mountain	—	6
Central	15	—
Quicksilver	15	15¼
Davidson Copper	—	35
Flint Steel River	—	4 00
Wallkill Lead	8	—
Wallkill, assented	14	16
Tudor Lead	3 50	—
Cumberland Coal	30	—
Lehigh and Susquehanna Coal	75	—
Buchanan Farm Petroleum	50	60
Central	55	65
Home Petroleum	7 00	—
National	—	2 75
N. Y. & Alleghany	50	1 00
Northern Light	45	—
Pithole Creek	1 25	1 95
Rynd Farm	15	—
United Petroleum Farms	16	20
United States	90	1 00
Rathbone Oil	—	45
Blood Farm	—	1 00

SAN FRANCISCO, CAL., July 7th, 1869.

Stocks.	Bid per ft.	Share.
Gould & Curry	116	117
Savage (per share)	91	88
Chollar Potosi	305	310
Ophir	20¼	20¼
Hale & Norcross	133	
Crown Point	54½	
Yellow Jacket	63	65
Belcher	24	
Imperial (per share)	75	
Alpha (per share)	29	
Kentuck	171	

DIVIDENDS, ETC.

The Chollar Potosi Mining Company have declared a dividend of $20 coin per share, payable July 7th. Hale & Norcross and Sierra Nevada Mining Companies have also declared dividends, the former $6 and the latter $2.50 per share, payable July 10th. The Sierra Nevada Company has increased its capital from $1,500,000 to $3,000,000, divided into fifteen thousand shares at $200 each.

MISCELLANEOUS.

LEWIS AUDENRIED & CO.,

Miners and Shippers of the following celebrated

ANTHRACITE COALS.

From Philadelphia and the Mines.

DIAMOND, - - - - - - - - Red Ash.
SPOHN, - - - - - - - - - " "
ORCHARD, - - - - - - - - Pink "
BROAD MOUNTAIN, - - - - - White "
LOCUST MOUNTAIN, - - - - - " "
BLACK HEATH, - - - - - - - " "
OLD COMPANY'S LEHIGH.
WILKESBARRE.

From Port Johnston and Jersey City,

OLD CO.'S LEHIGH, HAZLETON, WILKESBARRE, AND SHENANDOAH COALS.

Also the superior CUMBERLAND COALS,
BROAD TOP, BARTON, BARTON,
SEMI-BITUMINOUS, at Philadelphia. GEORGES CREEK, at Baltimore. GEORGES CREEK, at Alexandria.

205 Walnut Street, PHILADELPHIA; 14 Kilby Street, BOSTON; 34 Westminster Street, PROVIDENCE; 24 Second Street, BALTIMORE.

110 BROADWAY, NEW-YORK.

July 13-1y

Valuable Coals Lands in Virginia

FOR SALE OR LEASE.

The undersigned, in pursuance of a decree of the circuit court of the county of Henrico, in the State of Virginia, made on the 3d day of May, 1869, will receive proposals in writing, either for the purchase or lease, from and after the 31st December, 1869, of the whole, or any part, of the coal lands situated in Chesterfield county, Va., belonging to the Chesterfield Coal and Iron Mining Company.

The lands cost said company more than $300,000. The mines which they contain have been, and are now being, profitably worked by the present lessees, and the property is considered of great value for its coal and iron ore.

The different tracts are known as follows:

"Wooldridge's and Falling Creek," containing about 204 acres.
"Black Heath," 99 acres.
"Barker and Branch's," 99 acres.
"Harvie and Harris's," 224 acres.
"Cullin's," 76 acres.
"Martin's" (one tract), 30 acres.
"Martin's" (another tract), 326 acres.
"Salle Pits," 200 acres, and a coal-yard and land attached thereto, on James river, opposite Richmond, containing upward of 4 acres.

Inquiries and proposals may be addressed to the undersigned, post-office box No. 342, Richmond, Va., until the 20th day of October, A.D. 1869.

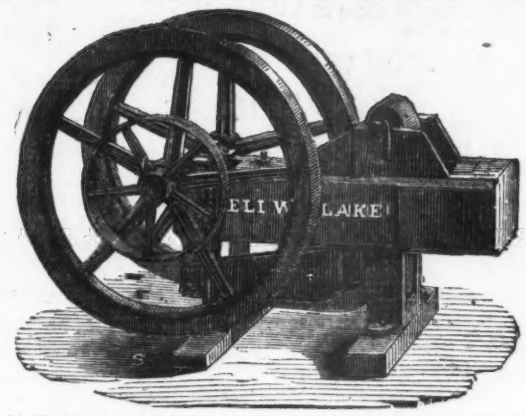
It is recommended that the proposals be made as specific as possible, since the decree requires them to be reported to the court for its approval or disapproval at the next term, commencing on the 25th day of October, 1869.

ANDREW JOHNSTON,
POWHATAN ROBERTS,
Special Commissioners.

July 6-3t

MINING MACHINERY.

BLAKE'S STONE BREAKER.



The office of this Machine is to break Ores and Minerals of every kind into small fragments, preparatory to their further comminution by other machinery.

This machine has now been in use, enduring the severest tests, for the last ten years, during which time it has been introduced into almost every country on the globe, and is everywhere received with great and increasing favor as a labor-saving machine of the first order.

Illustrated circulars, fully describing the machine, with ample testimonials to its efficiency and utility, will be furnished on application, by letter, to the undersigned.

☞ The Patents obtained for this machine in the United States and in England having been fully sustained by the courts, after well-contested suits in both countries, all persons are hereby cautioned not to violate them; and they are informed that every machine now in use or offered for sale, not made by us, in which the ores are crushed between upright convergent faces or jaws actuated by a revolving shaft and fly wheel, are made and used in violation of our patent.

March 14-1y 351 **BLAKE BROTHERS, New-Haven, Conn.**

GREAT WESTERN

Mining and Manufacturing Company.

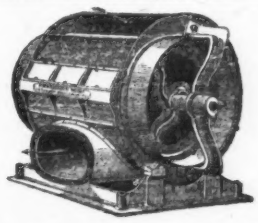
CHAS. HENDRIE, President.

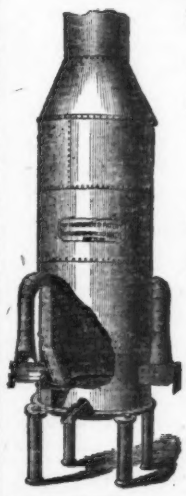
MANUFACTURES OF MINING MACHINERY,

AND WHOLESALE DEALERS IN

Mining Supplies.

Our list of patterns includes all the improved processes for the procuring and saving of Gold and Silver from the ores, and it is the intention of the company to procure the right to manufacture all new improved mining machinery as fast as brought before the public. Our list, in part, is composed of the following machinery: Quartz Mills, stamps of any weight desired. Engines and machinery for same, of any size or description known to the trade. Amalgamators, Crushers, Desulphurizers, Engines, portable, hoisting, and pumping, of the most approved construction. Saw Mills, portable or stationary. Shingle Machines, H. H. Low's Patent. We also furnish in lengths to suit, Steam and Conducting Pipes, Steam Gauges, Brass Fixtures, Bolts, Belting, and, in fact, every thing needed by Mining Companies. Our works are located at the following places: BURLINGTON, Iowa; COUNCIL BLUFFS, Iowa; CENTRAL CITY, Colorado, and HELENA, Montana. The advantage of ordering machinery of us will be plainly seen from the fact of our having branches of our works in the mining regions, thereby enabling the companies to procure their repairs there, without having to send back to the States for same, which they would be compelled to do did they procure their machinery at an Eastern shop. Our prices here are the same as the Eastern prices, thereby saving to the companies the extra expense of freight to the West. We will contract to deliver freight at any point on the Missouri River, and will be prepared to send a competent man to superintend the erection of the machinery at the mill if desired. Plans and specifications of the mills furnished to all ordering machinery of us. We would be pleased to receive an order from you for any thing in our line, and feel confident we can fill it to the satisfaction of your company. All orders for machinery should be addressed to WM. C. HENDRIE, Secretary, Burlington, Iowa. Address for information to C. F. HENDRIE, Council Bluffs, Iowa. CHAS. HENDRIE, Helena, Montana. May 29-6m





SMITH & SAYRE

MANUFACTURING CO.,

PROPRIETORS AND MANUFACTURERS

OF THE

Mackenzie Patent

BLOWER and CUPOLA and SMELTING FURNACE.

Also, Mackenzie's Patent GAS EXHAUSTER and COMPENSATOR. Address

SMITH & SAYRE

MANUFACTURING COMPANY, 95 Liberty Street, N. Y. Send for illustrated pamphlet.

Mar. 25-1y

English Gun Cotton.

About 1500 pounds very superior ENGLISH GUN COTTON,

IN WATER-PROOF COVERING,

(surplus stock) may be had at less than cost of importation. Address

A. K. P. Welch.

Agent of Commonwealth of Massachusetts,

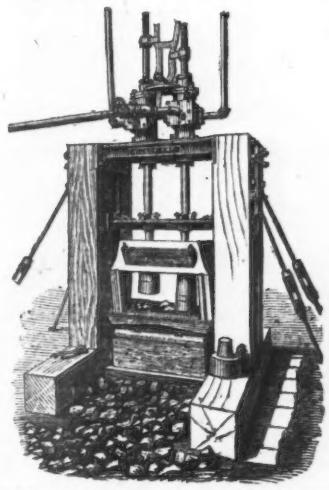
Apr. 10-3m CAMBRIDGE, MASS.

THE WILSON PATENT

STEAM STAMP-MILL COMPANY,

OF PHILADELPHIA, PA.

Are now prepared to supply Miners and other parties with their



NEW STEAM STAMP-MILLS

AT THE SHORTEST NOTICE.

These Mills have now been in operation for upward of a year, and have proved to be the most durable and efficient, as well as the lightest for transportation, of any Mills now used. The valve gear is of the simplest and most durable construction, readily adjustable by movable cams on the piston rods or stamp stems, thereby giving the operator absolute control of the length and velocity of motion and force of the blow. These Mills are adapted for both dry and wet crushing, and for the hardest rock or softest cement. These Mills are every way equivalent to a Twenty Stamp Mill. For full particulars, call on or address

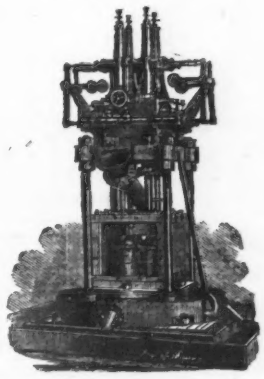
THE WILSON PATENT STEAM STAMP-MILL COMPANY,

326 WALNUT STREET, PHILADELPHIA.

May 7-1y

New-York Steam-Engine Company,

Manufacturers of



STEAM STAMPING MILLS,

2 | **Stationary and Portable Engines,**

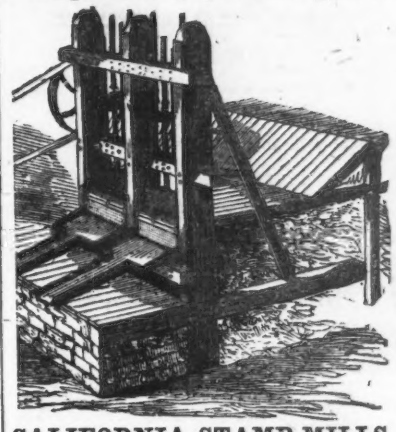
Engine Lathes, Planers, Bolt Cutters, Upright Drills and Machinists' Tools of all descriptions.

OFFICE AND WAREROOMS,

Jan. 2-1y-is Nos. 126 & 128 Chambers St., N. Y.

MINING MACHINERY, ETC.

Mining Machinery and Supplies.



CALIFORNIA STAMP MILLS,

With Iron or Wood Frames.

WHEELER & RANDALL'S

PATENT

Excelsior Grinder and Amalgamator.

Conoidal Separator and Tabular Concentrator,

With Self-Discharging Quicksilver Apparatus.

HEPBURN & PETERSON'S

Pan and Separator.

Rock Breakers, Retorts, Engines, Boilers, and Shafting, Shoes and Dies of the best White Iron and Steel.

Plans, Drawings, and Specifications for Quartz Mills furnished, and practical information in Mining, Milling, Amalgamating and Concentrating Gold and Silver Ores given.

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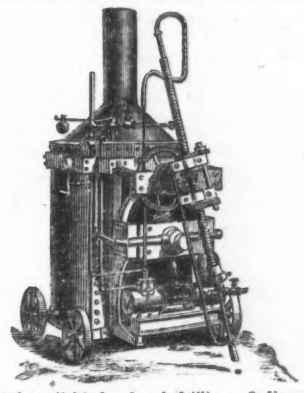

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Concentration by means of Air

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Apr. 24-1y-q

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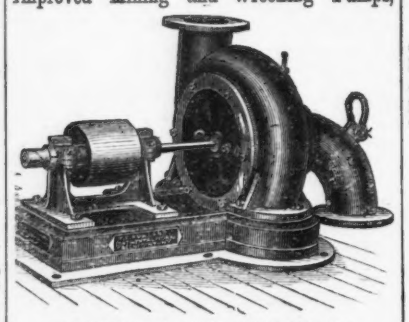

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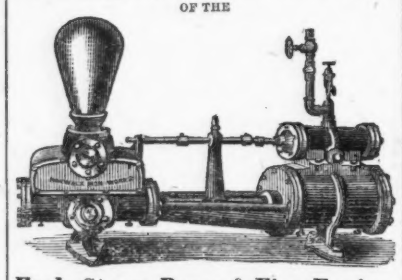

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STEAM AND BLOWING ENGINES,

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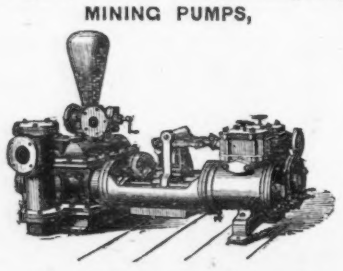

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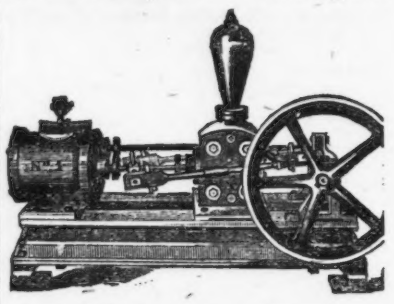

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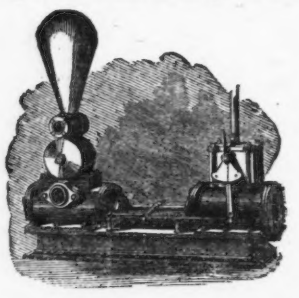

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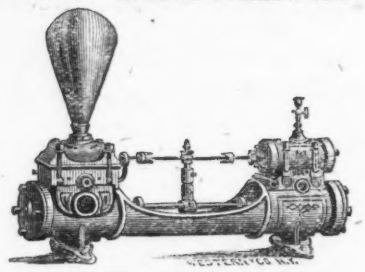

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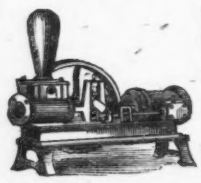

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OFFICE—37 Park Row, New-York City.
Jan. 30-tf-os

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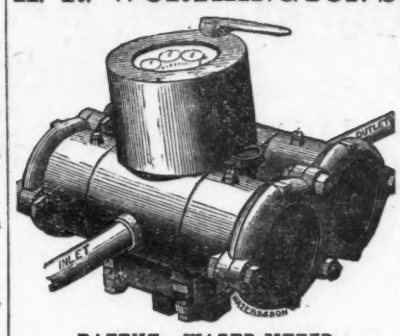

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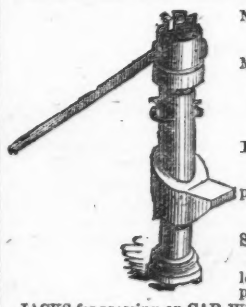

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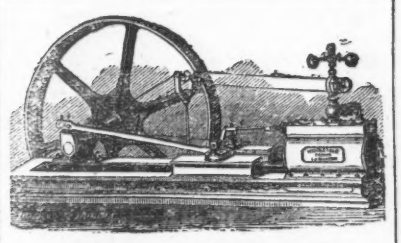

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" Quantity of, produced by the furnace
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" The great friction of produced by one mode of ventilation, and how reduced by another
" Pure added to impure (plans)
" Splitting of (plans)
" One current of (plans)
" One current of, and how to adopt separate currents (plan)
" Dividing of, but not into "separate and distinct" current (plans)
" Crossings (see H on plans)
" Weight of in shafts
" How to find the weight of
" Table of pressure in shafts
" Expansion of
" Its velocity and force
" Rush of, into each division
" Quantity produced by natural ventilation
" Splitting, why it should be adopted
" Splitting, why the workmen object to Mr. Hopton adopting the mode
Anemometer, measurement of air by, engraving of
Area of a pit, how to find
Barometers, showing the time of an outlet of gas in mines (engraving)
Bricks, how to find the number in the walling of a shaft
Buddle's plan
Circumference of a pit, how to find
Coal, several ways of working it out, and why man methods of working it out are adopted
" Working out in banks (plans)
" Working it out in following up banks (plan)
" Working out in pillars (plans)
" Working out in long wall (plans)
" Working out in drifts (plans)
" Working out with no regularity (plan)
" Working out by the "end way" or in endings (plan)
Cubical contents of a pit, how to find
Dialing, the mode of
Dials, several engravings
" How constructed
" How fixed in mine surveying
" Needle, its variations
Diameter of shaft
Dip of mine, how to find and lay on (plan)
Explosion, the power of an
" At Lund-hill, in what part of the mine it was supposed to take place (plan)
" How the power may be diminished
Furnace, how to find the horse power of
" The place of fixing, to produce the largest ventilating current
" Engravings of ground floor, front and back view
" Remarks upon
Gases (Carbonic acid) composition of
" Do. properties of
" (After, or choke damp) composition of
" (Carburetted hydrogen) do.
" Choke damp and carbonic acid, not one and the same in quality
" The effect produced on people by inhaling such
" The quantity required for an explosive mixture
" The elasticity of
" The weight of
" The nature and quality of
" Why some mines generate and produce more than others
" Why some mines generate a mixture of
Goaf, or gob, how tramrods are made through (plan)
Lund-hill (plan)
Managers, who are best competent to manage mines
Miscellaneous questions
Natural ventilation
Planning, how workings are laid on the plan
Regulators, how to find open space
Regulations (see R on plans)
Safety Lamps, why flame will not penetrate through, engraving of
Sections on mechanical ventilation
Summary of accidents
Surveying, how mines are with the dial
Surveying, how mines are with the theodolite
Tables of weights and measures
Temperature on surface
Temperature in mines
Temperature, difference of between down and up-cast
Theodolites for mine surveying
Theodolites, how constructed
Theodolites, the magnetic needle dispensed with, and how workings are laid on plan, with Theodolite surveying
Theodolites, how mines are surveyed with them
Up-cast larger than down-cast (plan)
Ventilating mines by mechanical power
Ventilation, several ways of
Weather, how a change of affects the workings
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Table of Contents of the First Half-Volume of "The Manufacturer and Builder,"

[*ILLUSTRATED ARTICLE'S ARE MARKED WITH AN ASTERISK.*]

JANUARY.

*Gold and Stock Telegraphy, ... 1
Persian Arms, Damask Steel, and Damaskeening, ... 2
How to cause a Tempest in a Teapot, ... 2
The Causes of the Difference in the Color of Bricks, ... 3
How to make different Cements, ... 3
Learned Blacksmiths, ... 3
*Dove-Tail Joints, ... 4
Wall-damp, ... 5
The Utilization of Tin Scraps, ... 6
The Firmness of Paper, ... 6
New City Buildings, ... 7
*Have you ever looked through a Microscope? ... 8
The Mechanic and his Work, ... 8
Reversible Seats, ... 9
Preventive of the Decay of Wood, ... 9
Colorado Manufactures, ... 9
Chemical Engineering, ... 10
The New Art of Fresco-Painting, ... 10
"Old Says" on Building, ... 11
The Progress of Building, ... 11
Chrome-Yellow Paint, ... 11
*Hints for Sign-Painters, ... 12
Imitation-Marble, ... 13
Common Mortar, ... 13
New Paint for Floors, ... 13
Apatite; Its Importance in Domestic Economy, ... 14
Gun-Cotton, ... 14
The Preservation of Wood by Immersion, ... 14
Ventilation and Heating by Currents, ... 15
Cement and Mortar of the Ancients, ... 15
Bridging the Missouri, ... 16
*The Park Bank Building—A Palace of Finance, ... 17
The Air in Lecture and School-Rooms, ... 18
Prize Problems, ... 19
Glass, ... 19
*Improvement in Saws, ... 20
Hoosac Tunnel, ... 21
*Deep-Sea Cables, ... 22
An Important Invention, ... 22
To the Public, ... 22
Trades' Unions in the United States, ... 23
Literary, ... 23
Mechanics' Homes, ... 24
*Long Island Villa, with Mansard Roof, ... 24
*Villa Cornice Work, ... 25
Children's Toys, ... 25
To the Press, ... 26
Occupations and Wages in California, ... 26
Queries, ... 27
Special Notice to Travellers, ... 27
Advertisements, ... 27

FEBRUARY.

*Portable Wainscoting, ... 33
Ventilation and Warming, ... 34
A Few Words about Bricks, ... 35
*The Bessemer Process and its Late Improvements, ... 35
Wire-Rope, ... 37
Hollow Walls, ... 39
Rock-Drilling Machine, ... 39
Mr. Mudge on Woolen Manufactures, ... 39
*Water-Proofing Dress Goods, ... 40
Insoluble Cements, ... 40
Atmospheric Action on Building-Stones, ... 40
*Anatomy of the Screw, ... 41
Lead Pencils, ... 41
Artificial Light and the Subject of Ventilation, ... 42
Architecture and Civilization, ... 43
Arches—Old and New, ... 43
*Manufacture of Sheet Tin, ... 44
Rates of Travel, ... 44
*Hand-Power Machine, ... 45
The History of Windows, ... 45
To Restore Burnt Cast-Steel, ... 45
To Bleach Palm-Oil, ... 45
The Building-Stone and Slate of Virginia, ... 46
The New-York Milling Interest, ... 47
*The New-City Post-Office, ... 48
Review of City Buildings, ... 50
Decay of Wood and Processes for Preserving it, ... 51
The Daguerrean Process, ... 51
To obtain Different Shades of Chrome-Yellow, ... 52
*Improved Cupola and Blower, ... 52
Literary, ... 54
Real Estate for Workingmen, ... 55
The Philosophy of Building, ... 55
*Villa and Cottage Architecture, ... 56
Consumption of Milk, ... 57
Trades and Professions, ... 58
Bread-Making, ... 58
Castle-Garden, ... 58
Queries, ... 59
Special Notice to Travellers, ... 59
Advertisements, ... 59

MARCH.

*Brick-Making, ... 65
Absorbent Capacity of Bricks, ... 66
Lake Colors—Their Nature and Manufacture, ... 67
*Steam-Dredging and the Suez Canal, ... 68
The Selection of Wall-Paper, ... 71
*Marble Paper Manufacture, ... 71
Sand-Grinding Machine, ... 73
*The Gothic Furnace, ... 74
Ventilation and Heating by Currents, ... 74
*The Ventilation and Warming of School-Houses, ... 75
*Iron Buildings, ... 76
Hints on Economic Building, ... 78
Copper and its Alloys, ... 79
Cryolite—Where found, Nature, and Uses, ... 80
Chrome-Orange, ... 80
*Illinois State Capitol Design, ... 80
The Uses of Gun-Cotton, ... 82
Terra Cotta, ... 82
Building-Stones—Their Preservation, ... 82

APRIL.

*Improvement in Hand-Drills, ... 97
Renovating Silk Hats, ... 97
Memoranda concerning Nails, ... 98
Comparative Weight of Pattern and Castings, ... 98
Flint-Glass, ... 98
Wolfram or Tungsten Steel, ... 99
Cheap Brick Walls, ... 99
*Stereotyping, ... 99
Edge-Tools, ... 102
Road-Dust and Vegetation, ... 102
Aniline Colors, ... 102
Soap-Making in the Olden Time, ... 103
*Manufacture of Vinegar, ... 104
Textile Fabrics from Glass, ... 104
The Effect of Artificial Light upon the Eyes, ... 105
*The Daguerrean Process, ... 105
Building in California, ... 105
The Piano-Forte, ... 106
The Art of Gilding, ... 106
Ventilation and Warming, ... 107
*Ventilation and Warming of School-Houses, ... 108
*The New-York Fire-Place Heater, ... 109
Cheap Houses—Building on Pisé, ... 110
*The Vermont Slate Industry, ... 83
Literary, ... 86
"Too Many Irons in the Fire," ... 87
The Tinning and Silvering of Looking-Glasses, ... 87
*French Sash-Windows, ... 88
*Whence came our Silks? ... 88
*Cottage and Villa Architecture, ... 89
What Shall Workingmen Read? ... 90
The Dwarf Builders, ... 90
Nature as a Builder, ... 91
Sharpening Files by Corrosion, ... 92
Queries, ... 92
Special Notices, ... 92
Advertisements, ... 92
Economic Furniture, ... 111
The Manufacture of Cases for Percussion-Caps, ... 111
*The Thames Embankment, ... 112
*Automatic Indicator for Water and Steam, ... 115
*Winds and Chimney Draughts, 115
*Improved Electric Fuse, ... 116
*Stone-Breaking and Ore-Crushing, ... 117
Literary, ... 118
Are Men Equal? ... 119
Beauty in the Household, ... 119
Coöperation, ... 120
Irish Moss, ... 121
*Cottage and Villa Architecture, ... 121
Public Baths, ... 121
Manufacture of Brushes, ... 122
A Large Building, ... 122
To Clean Glass, ... 122
How to Make the Peasley Cement, ... 122
Polytechnic Association of the American Institute, ... 122
Manufacturer and Builder at $1.50 per year—How it is Done, 122
Large Cash Premiums, ... 123
Queries, ... 123

MAY.

*The Telephone, ... 129
Peroxide of Hydrogen for the the Hair, ... 130
The Daguerrean Process, ... 130
Glue, ... 130
How to put a Cross-cut Saw in Order, ... 131
Coraline Dye—Injurious Effects Therefrom, ... 131
Mixing Things Up, ... 131
*On Boiler Explosions, ... 132
How to Repair Chain Pumps, ... 134
New Element, ... 134
*Béton Building, ... 135
Hydraulic Mortar, ... 135
Shellac for Water-Proof Coatings, Dyes, Paints, and Printing Inks, ... 136
*Improvement in Billiard Tables, ... 137
Historical Notes on Paper Manufacture, ... 137
Kalsomining Walls, ... 138
A Plea for Stone, ... 138
On Forging, Hardening, and Tempering Mill-Picks, ... 139
Chrome-Yellow Paint Practically Tested, ... 138
*Water-Closets, ... 140
Welding Copper, ... 140
The Largest Suspension Bridge, 140
*Improved Hoisting Apparatus, 141
Colored Marbles, ... 141
The Piano-Forte, ... 142
Thames Embankment—South side, ... 142
Seaweed Charcoal, ... 142
Ventilation and Warming, ... 143
The New Metal Hydrogenium, ... 144
Painting Zinc, ... 144
Artificial Alizarine for Coloring, 144
Priscian a little Scratched, ... 144
Suez Canal, ... 144
*The New State Emigrant Hospital, Ward's Island, ... 145
Magenta, ... 145
Varnishes for Iron, ... 147
Ornamental Glass—Opaline and Enamel, ... 147
Ship-Building—Here and in England, ... 147

APRIL.

Industrial Progress, ... 147
A New Ornamental Wood, ... 148
Sprinkling Streets with Deliquescent Salts, ... 148
*Old and New Fire-Grates, ... 148
Effect of Cold upon Tin, ... 148
Cryolite as a Source of Soda, ... 149
Literary, ... 150
Credit, ... 151
On Going Surety, ... 151
Interior Decorations, ... 151
*Church Architecture, ... 152
*Ornamental Work—Ceiling and Railing, ... 153
Purifying Water, ... 154
Adulterations, ... 154
Indelible Inks, ... 154
New Cements, ... 154
Welding Steel to Iron, ... 154
Queries, ... 155
New Advertisements, etc., ... 155

JUNE.

*Improved Steam Pump, ... 161
What Paint shall we use? ... 162
Varnishes—their Nature and Manufacture, ... 162
Something of practical Importance in the Use of Plaster-of-Paris, ... 163
Influence of Water in the Manufacture of Wax-Leather, ... 163
Why do we Oil our Whetstones? 163
Compressed Leather, ... 163
*The Art of Electrotyping, ... 164
Practical Hints on Working and Tempering Steel, ... 165
Spiritual Photographs, ... 167
"Too Much Pork for a Shilling," 167
Credit to whom Credit, etc., ... 167
Store-Shutters, ... 168
Damp Cellars, ... 168
The Velocipede as a Mechanical Agent, ... 168
Calculating Areas by Weight, ... 168
Aniline Gray, ... 168
The Generation of Oxygen Gas from Sulphuric Acid, ... 168
*On Testing Iron by Magnetism, 169
Blowing a Wine-Glass, ... 169
How Jewelry is Made, ... 170
American Wheels, ... 170
Ventilation and Warming, ... 171
The Manufacture of Pins, ... 171
Right-Handand Left-Hand Locks 171
Lisieux and its Linen Factories, 171
Cleaning Gilded Ware, ... 171
Encaustic Tiles, ... 172
*Salt—its Manufacture and Uses, 172
Paper Belting, ... 173
Vegetable Oils—their Production and Purification, ... 174
Chimneys and Chimney-Shafts, 174
Artificial Stone, ... 175
Plank Walls for Cottages, ... 176
New Fact in the Behavior of Iron, ... 175
Science and Art, ... 175
*The Kansas City Bridge, ... 176
Cement to resist Red Heat and Boiling Water, ... 178
Recovery of Fatty Matter from Waste Soap-Waters, ... 179
Paper Houses, ... 179
Sodium as a Substitute for Phosphorus in Lucifer Matches, ... 180
A Plea for Iron, ... 180
To Keep Nails from Rusting, ... 180
*Wrought-Iron Arch Girder Bridge, ... 181
Liquid Fuel, ... 181
New Mode of Breaking Masses of Iron, ... 181
Utilization of Street Dust, ... 181
Literary, ... 182
How to Spoil a Husband, ... 183
Chess, ... 183
A New Alloy, ... 184
*A Country or Suburban Barn, ... 184
A New Material for Bonnets, ... 185
*Design for a Summer House, ... 185
Workingmen as Students, ... 185
Eating, ... 185
The Philosophy of a Candle, ... 186
Adulterations, ... 187
Recipes for Earthern-Ware Glazing, ... 187
Hemp, ... 187
A Poor Prospect for the Year 1900, ... 187
Setting Fence-Posts, ... 187
Queries, ... 187
New Advertisements, ... 188

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